

**DRAFT ADDENDUM TO THE
ENVIRONMENTAL ASSESSMENT**

FOR THE

**CONSTRUCTION AND OPERATION OF
OPEN BURNING GROUNDS**

AT

PICATINNY ARSENAL, NEW JERSEY

18 July 2012

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1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Introduction and Statement of Project Need

This document is an Addendum to the Environmental Assessment (EA) for the Construction and Operation of the Open Burning Grounds at Picatinny Arsenal, New Jersey. The original EA is dated September 2005 and was circulated for public comment and completed in November 2005. Construction has been completed.

The new open burning area operated by the U.S. Armament Research, Development and Engineering Center (ARDEC), located at Picatinny Arsenal became operational on 1 June 2011. The area is used to treat the energetic waste generated through research and development activities conducted at Picatinny that cannot be treated in the incinerator. The former burning grounds are currently under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) closure.

This EA addendum addresses the requirement to increase the open burning annual limit from 5,000 pounds net explosive weight (NEW) to 20,000 pounds NEW and the daily limit from 200 pounds NEW to 325 pounds NEW at the new burning ground. The Proposed Action is required for two reasons. The first is as a contingency in the event that the incinerator should shut-down for an extended period of time. Picatinny would still require the capability to treat energetic waste that would typically go to the incinerator through open burning. The second is to support the continually evolving research and development mission which provides support for 90% of the Army's munitions used every day by the U.S. Warfighter. The integrated lifecycle engineering process required for research, development, production and field support, requires the demilitarization of energetics, while staying within the limits of the open burning Resource Conservation and Recovery Act (RCRA) permit and Open Burning Air Permit. In order to ensure that Picatinny does not exceed permit limits and at the same time is able to continue the research and development mission to support the U.S. Warfighter the RCRA permit limit would need to be increased. The incinerator has an exclusion list, which details the energetic waste that is not compatible with the grinding and incineration process. Energetic waste on the exclusion list cannot be safely treated at the incinerator and therefore must be treated through open burning. The incinerator will continue to be used to the maximum extent possible by treating all energetic waste that is not on the incinerator exclusion list. Although Picatinny continues to reduce open burning annually, the quantity of energetic waste generated that cannot go into the incinerator annually will exceed the current 5,000 pound RCRA permit annual limit.

1.2 Site Criteria

The Proposed Action will occur at the current open burning area (500 Area).

1.3 Summary of Proposed Action

The Proposed Action is to increase the open burning annual limit from 5,000 pounds NEW to 20,000 pounds NEW and to increase the daily operating limit from 200 pounds NEW to 325 pounds NEW. The Safety Site Plan for the New Open Burning Grounds prepared by the Armament, Research, Development and Engineering Center (ARDEC) at Picatinny and approved by the Department of Defense Explosive Safety Board, states that it is safe to open burn up to 325 pounds of energetic material at any one time. For consistency with safety limitations, the maximum daily limit would be increased to 325 pounds NEW.

This EA addendum is prepared in accordance with the requirements of the National Environmental Policy Act (NEPA); the Council on Environmental Quality (CEQ) Regulations for Implementing NEPA (40 Code of Federal Regulations [CFR] parts 1500 through 1508) for Army Actions; Protection of the Environment, Code of Federal Regulations (40 CFR, Part 280); and AR 200-2, Environmental Effects of Army Actions.

1.4 Potential Permits/Plans Required

RCRA Sub-Part X Permit annual and daily limit modification.
Open Burning Air Permit daily limit modification.

1.5 Decisions to be Made and Scope of the Analysis to be Conducted

The EA addendum supports the Army decision-making process relative to the Proposed Action. Specifically, the Army must decide whether or not to increase the daily and annual open burning limits at the Picatinny Arsenal. In addition to the considerations related to the requirements of NEPA and applicable regulations, the Army must also consider the military mission.

The scope of analysis for this EA addendum is limited to those environmental media areas where there is a suspected potential effect based on increasing the open burning annual limit. Areas of no suspected effect from the Proposed Action or alternatives, or areas adequately addressed in the original EA, are not addressed in this document.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The Proposed Action for this addendum is to increase the open burning annual limit from 5,000 pounds NEW to 20,000 pounds NEW and to increase the daily operating limit from 200 pounds NEW to 325 pounds NEW. The operation will occur in burn pans on concrete pads with concrete berms at the new open burning area. The burn pans will be elevated approximately 6 inches above the concrete pad with I-Beam legs or steel supports.

3.0 ALTERNATIVES CONSIDERED

3.1 Proposed Action

The Proposed Action is to increase the open burning yearly limit from 5,000 pounds NEW to 20,000 pounds NEW and to increase the daily operating limit from 200 pounds NEW to 325 pounds NEW. The operation is located at the current open burning area in the 500 Area of Picatinny Arsenal. The 500 Area has adequate space and is located away from known environmentally sensitive areas. The area is also compatible with the Quality Distance (QD) arcs from existing operations and facilities. Additionally, access to the proposed area is controlled. This action would provide a contingency plan in the event that the incinerator should shut down for an extended period of time, and provide continued capability to support the U.S. Warfighter.

3.2 No-Action Alternative

In accordance with NEPA regulations, the “no action” alternative to the Proposed Action must be considered. In the “no-action” alternative, the open burning annual limit would remain at 5,000 pounds NEW and the daily limit would remain at 200 pounds NEW, which would leave Picatinny without a

contingency if the incinerator should shut-down for an extended period of time. It would also limit Picatinny's capability to support the continually evolving mission in areas that utilize energetics that are excluded from treatment at the incinerator, beyond 5,000 pounds NEW annually.

3.3 Environmental Consequences

The EA Addendum evaluates potential impacts of implementing the Proposed Action and the No-Action Alternative. It was determined that most Valued Environmental Components (VECs) would not be affected by implementing the Proposed Action as shown in Table 1 below. The Proposed Action could have a potential minor impact on air quality however draft risk assessments performed show that there is no unacceptable risk to human health or the environment. Implementing the Proposed Action would not result in significant impacts to human health or the environment within or outside of Picatinny.

Table 1
Alternatives Analysis Matrix

Valued Environmental Components	Proposed Action	No-Action Alternative
Air Quality	Potential Minor Impact. Draft risk assessments show no unacceptable risk to human health or the environment.	No Impact.
Air Space	No Impact.	No Impact.
Cultural	No Impact.	No Impact.
Noise	No Impact.	No Impact.
Soil Erosion Effects	No Impact.	No Impact.
Biological Resources	No Impact.	No Impact.
Wetlands	No Impact.	No Impact.
Water Resources	No Impact.	No Impact.
Facilities	No Impact.	No Impact.
Socioeconomics	No Impact.	No Impact.
Energy Demand/Generation	No Impact.	No Impact.
Land Use Conflict/Compatibility	No Impact.	No Impact.
Haz Mat/Haz Waste	No Impact.	No Impact.
Traffic and Transportation	No Impact.	No Impact.
Wildlife Management	No Impact.	No Impact.

4.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

This section addresses the relevant resource components of the existing environment. It is this baseline condition that will be used to determine the potential for environmental impact from the implementation of the Proposed Action.

4.1 SETTING

The proposed site location is located at the current open burning area in the 500-area of Picatinny Arsenal. The 500-area has adequate space and is located away from known environmentally sensitive areas. The area is also compatible with the Quality Distance (QD) arcs from existing operations and facilities. Additionally, access to the proposed area is controlled and therefore safety can be controlled.

4.2 AIR QUALITY

National and New Jersey Ambient Air Quality Standards (AAQS) for six specific air pollutants (“criteria” pollutants) have been established by the Environmental Protection Agency (EPA) to protect the health and welfare of the public. Ambient air quality in the county and statewide does not meet the National and New Jersey AAQS for ozone (O₃), and is therefore designated by EPA, per 40 CFR 81, as a severe non-attainment area for ozone. Nitrogen oxides (NO), and volatile organic compounds (VOC) are precursors to ozone formation, and are regulated as nonattainment pollutants.

Based on facility-wide potential emission rates, the Picatinny Arsenal is classified as a major source of air contaminants pursuant to the New Jersey Administrative Code Title 7, Chapter 27, Subchapter 22 (N.J.A.C. 7:27-22) and is subject to the federal Title V operating permit program requirements specified in this regulation. The Proposed Action will require a modification to the Open Burning Air Permit to increase the daily limit from 200 pounds NEW to 325 pounds NEW.

4.3 GROUNDWATER

The groundwater located within the confines of Picatinny Arsenal is found in sediments deposited during the Quaternary Period within the last one million years (USGS 1965). At Picatinny Arsenal, there are three major regional water-bearing zones, including a shallow unconfined aquifer, a confined aquifer, and a confined bedrock aquifer (Stone and Webster Engineering 1997). The Arsenal’s groundwater resides in the “Upper Rockaway” aquifer. South of Picatinny Lake, the bedrock and glacial sediments are divided into a sequence of six permeable layers and five intervening, low-permeability layers. The groundwater flow regime is influenced by Green Pond Brook, which flows in a southwesterly direction through the center of the Arsenal. Groundwater flow is primarily horizontal and upward in both the unconfined and confined glacial aquifers, and discharges into Green Pond Brook. Currently, there are three water supply wells in use at Picatinny Arsenal, and all are located in the area southwest of Picatinny Lake and are screened from the confined aquifer system. Based on the monitoring wells located in the vicinity of the proposed site location, the depth to groundwater is 8-10 feet.

5.0 ENVIRONMENTAL CONSEQUENCES OF THE ALTERNATIVES

This section describes the potential effects or impacts of the alternatives considered in this EA. There were no feasible alternatives to the Proposed Action identified based on the action requirements. The impact analysis is divided by media.

5.1 AIR QUALITY

The increase in open burning limits conducted at the new burning grounds would cause air emissions from the increase in open burning of energetic material being treated. Two risk assessments were performed to evaluate and present potential human health risks and ecological hazards posed or potentially posed by emissions to receptors. The first is the Draft Open Burning (OB), Open Detonation (OD), and Detonation Chamber (DC) RCRA Units Risk Assessment (Appendix A) which evaluated individual and cumulative effects from open burning (20,000 pounds NEW/year, 325 pounds NEW/day), open detonation and the detonation chamber operating at maximum capacity. The second is the Draft Cumulative Risk Evaluation for Picatinny Arsenal (Appendix B) which evaluated the cumulative effects of all RCRA emission sources (OB, OD, DC and Incinerator) and all non-RCRA emission sources on Picatinny. The human health risk assessments and screening level ecological risk assessments were performed to comply with the New Jersey Department of Environmental Protection (NJDEP) and Environmental Protection Agency (EPA) policies and permitting requirements. Risk conclusions in this

EA addendum and the Finding of No Significant Impact (FNSI) are based on preliminary draft risk assessments that have not yet been approved by Federal and State regulators.

Major conclusions from the Draft OB, OD and DC RCRA Units Risk Assessment are:

1. OD/DC/OB emissions are not a Cancer risk concern for the Maximum Exposed Individual (MEI) Receptors based on the EPA threshold of one in one million, using realistic exposure assumptions and chemical transfer factors. Worst-case Cancer risks were determined to be less than one in one million for the additional more realistic receptor locations quantified in the Risk Assessment (e.g., on-base residential housing area, on-site office worker area, on-site child care centers, hypothetical off-site residences at the Facility boundary, and off-site schools and parks).
2. Non-Cancer hazard estimates for the quantified MEI Receptors are all below EPA's target hazard threshold of 1.0.
3. No ecological concerns exist for the modeled chemicals of potential ecological concern (COPEC) concentrations in soil from RCRA unit emissions.
4. No ecological concerns exist for the modeled COPEC concentrations in surface water and sediment from RCRA unit emissions.
5. Elevated acute hazards for lead (i.e. maximum 1 hr concentrations) suggest adverse effects for individuals immediately downwind of the OB area during treatment events. However, the 1,116 foot exclusion zone around the OB area and workers being expected to comply with Occupational Safety and Health Administration (OSHA) regulations and Standing Operating Procedures (SOPs) requirements to wear respirators as needed for their safety and protection during burn operations would mitigate for this potential exposure.
6. OB annual treatment volume limits should not be based on short-term worker exposure because acute hazards would not be realized due to the exclusion zone as well as OSHA and SOP personal protective equipment requirements for burning area workers. In addition, the scaling used to estimate an acceptable annual treatment amount (presented below) did not take into consideration potential acute exposure. Acute hazard thresholds are only guidance and thus considerably different than the chemical-specific chronic cancer slope and inhalation unit risk factors, and non-cancer chronic reference doses and concentrations formally published by the EPA.
7. An annual treatment volume of 50,000 lbs NEW would not result in unacceptable risks and hazards at the OB area.

Major conclusions from the Draft Cumulative Risk Evaluation for Picatinny Arsenal (all RCRA and non-RCRA units) are as follows:

1. Cumulative cancer risks and non-cancer hazards are below NJDEP target levels of one in one hundred thousand and one, respectively, for air contaminant emissions, and are deemed acceptable.
2. Cumulative concentrations for lead were at an acceptable level, as they were below the National Ambient Air Quality Standard (NAAQS) of 0.15 ug/m³.

Based on the results of the two draft risk assessments performed on Picatinny emission sources, an annual OB limit of 20,000 pounds NEW and daily limit of 325 pounds NEW, would not have unacceptable human health risks and hazards, or unacceptable ecological hazards. In addition, air modeling conducted as part of the draft risk assessment for the Proposed Action and all existing operations on Picatinny has shown that air emissions will result in air concentrations below published NAAQS.

Air emissions from the no action alternative will be within air quality limits as shown in the EA for the Construction and Operation of Open Burning Grounds at Picatinny Arsenal, New Jersey, September 2005.

5.2 GROUNDWATER

Picatinny has an NJDEP approved Ground Water Monitoring Plan for the Open Burning Grounds 500 Area/Subpart X Miscellaneous Unit, dated November 17, 2011. The plan consists of five monitoring wells on a designated sampling frequency of quarterly for one year followed by a statistical evaluation of the data and possible reduction in sampling parameters and frequency to annual.

The no action alternative will have no impact on groundwater.

5.3 UNAVOIDABLE ADVERSE EFFECTS

This section summarizes adverse impacts resulting from the Proposed Action. There will be no unavoidable adverse impacts from the increase in open burning operations with adherence to permit/plan conditions. The primary potential impact from operating the open burning grounds will be from air emissions. However, an air emissions model conducted as part of the draft risk assessments shows that emissions will be below air conformity guidelines (i.e., NAAQS) and will therefore not cause a deleterious impact to the air quality. In addition, based on the results of the two draft risk assessments performed on Picatinny emission sources, an annual OB limit of 20,000 pounds NEW and a daily limit of 325 pounds NEW will not have unacceptable human health risks and hazards, or unacceptable ecological hazards.

5.4 CUMULATIVE EFFECTS SUMMARY

Cumulative impacts result from the incremental impact of the Proposed Action added to past, present, or foreseeable actions in the future. Unacceptable cumulative impacts (i.e., chronic cancer risks, chronic non-cancer hazards, and acute hazards) are not anticipated from the Proposed Action. In addition, the air modeling performed for this action shows that no published NAAQSSs will be exceeded. Based on the results of the two draft risk assessments performed, which analyzed cumulative effects from all Picatinny emission sources, an annual OB limit of 20,000 pounds NEW and daily limit of 325 pounds NEW will not have unacceptable human health risks and hazards, or unacceptable ecological hazards.

5.5 MONITORING SUMMARY

Although the Proposed Action in itself will not cause adverse impacts, Picatinny will continue to monitor and model, when necessary, air emissions to ensure that air quality is not being compromised through the Proposed Action and related actions. In addition soil and groundwater sampling and analysis monitoring is being performed for TAL metals, VOCs, SVOCs, propellants and baseline explosives.

5.6 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

There is limited irreversible and irretrievable commitment of resources as a result of implementing the Proposed Action. The site location is already established and operational. Operating the facility at a higher open burning annual and daily limit will produce air emissions but will not exceed NAAQSs and will not adversely impact the environment.

6.0 SUMMARY AND CONCLUSIONS

This EA addendum addresses the requirement to increase the open burning annual limit from 5,000 pounds NEW to 20,000 pounds NEW and increase the daily limit from 200 pounds NEW to 325 pounds NEW. The open burning grounds will only be used for those items that cannot be treated in the incinerator which is currently operational on Picatinny. The proposed increase in open burning will not result in a significant impact to the environment. The primary potential impact comes from air emissions that will be generated from an increase in open burning operations. Based on the results of the two draft risk assessments performed on Picatinny emission sources, an annual OB limit of 20,000 pounds NEW and daily limit of 325 pounds NEW will not have unacceptable human health risks and hazards, or unacceptable ecological hazards. In addition, air modeling performed as part of the draft risk assessment for the Proposed Action and all existing operations on Picatinny has shown that no NAAQSs will be exceeded.

Environmental media, including air, water resources, groundwater, soils, and sediment, biological resources, and cultural resources, were adequately addressed in the original EA, Construction and Operation of Open Burning Grounds at Picatinny Arsenal, September 2005 and/or the current draft risk assessments, and will not be adversely impacted by the Proposed Action.

Based on the analysis presented in this document, this environmental assessment concludes that the Proposed Action will not result in a significant impact to the environment. Therefore, an Environmental Impact Statement is not necessary for this Proposed Action. This conclusion will be documented in a FNSI.

7.0 LIST OF PREPARERS AND PERSONS OR ORGANIZATIONS CONSULTED

The following agencies, organizations, and personnel were consulted and assisted in the preparation of this environmental assessment:

Name	Consultation/Preparation Area	Organization
Freddy Sanchez	RCRA/Draft Risk Assessments	Environmental Affairs Division (EAD)
Wesley Myers	NEPA	EAD
Larry Brady	NEPA/Legal	Legal Office
Mark Weisberg	Draft Risk Assessments	Shaw Environmental, Inc.
Rodney Morgan	Open Burning Operations	ARDEC
Sybil Lusardi	Preparer of EA Addendum	ARDEC

DRAFT
FINDING OF NO SIGNIFICANT IMPACT (FNSI)

Environmental Assessment (EA) Addendum
Construction and Operation of Open Burning Grounds at Picatinny Arsenal
U.S. Army Armament Research and Development Center
Picatinny Arsenal, NJ 07806-5000

18 July 2012

Description of Proposed Action and Alternatives Considered

The Proposed Action, for which an environmental assessment addendum was prepared, is to increase the open burning yearly limit from 5,000 pounds net explosive weight (NEW) to 20,000 pounds NEW and increase the daily limit from 200 pounds NEW to 325 pounds NEW at the open burning area. The Proposed Action is necessary to treat energetic waste generated through research and development activities conducted on-site at Picatinny Arsenal by the U.S. Armament Research Development and Engineering Center. The open burning area will be used for energetic waste that cannot be safely treated in the incinerator. The incinerator has an exclusion list, which details the energetic waste that is not compatible with the grinding and incineration process. The incinerator will continue to be used to the maximum extent possible by treating all energetic waste that is not on the incinerator exclusion list.

The Proposed Action will occur at the current open burning area (500 Area). The former burning grounds are currently under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) closure.

The “no action” alternative did not meet the need for an increase in open burning operations at the open burning area located at Picatinny. In the “no-action” alternative, the open burning yearly limit would remain at 5,000 pounds NEW and the daily limit would remain at 200 pounds NEW, which would leave Picatinny without a contingency if the incinerator shuts down for an extended period of time. It would also limit Picatinny’s capability to support the continually evolving research and development mission and the U.S. Warfighter in areas that utilize energetics that are excluded from treatment at the incinerator, beyond 5,000 pounds NEW annually.

Anticipated Environmental Effects

The proposed increase in open burning operations at the open burning area would result in no significant environmental impact.

Air emissions are the only anticipated environmental effect from the increase in open burning operations at the open burning area. Two risk assessments were performed to evaluate and present potential human health risks and ecological hazards posed or potentially posed by emissions to receptors. The first was the Draft Open Burning (OB), Open Detonation (OD), and Detonation Chamber (DC) RCRA Units Risk Assessment which evaluated individual and cumulative effects from open burning (20,000 pounds NEW/year, 325 pounds NEW/day), open detonation and the detonation chamber operating at maximum capacity. The second was the Draft Cumulative Risk Evaluation for Picatinny Arsenal which evaluated the cumulative effects of all RCRA emission sources (OB, OD, DC and Incinerator) and all non-RCRA emission sources on Picatinny. The human health risk assessments and screening level ecological risk assessments were performed to comply with New Jersey Department of Environmental Protection (NJDEP) and Environmental Protection Agency (EPA) policies and permitting requirements. Risk conclusions in the EA addendum and this FNSI are based on preliminary draft risk assessments that have not yet been approved by Federal and State regulators. The draft risk assessments showed no unacceptable adverse effects on human health and the environment. In addition, the Draft Cumulative Risk Evaluation showed that cumulative concentrations of lead were below the National Ambient Air Quality Standard (NAAQS) of 0.15 ug/m³. In addition, air modeling conducted as part of the draft risk assessments for the Proposed Action and all existing operations on Picatinny has shown that air emissions will result in air concentrations below published NAAQS. Therefore, the EA addendum concluded that the Proposed Action would not have any significant adverse impacts on human health or the environment.

Conclusion

The Proposed Action is to increase the open burning yearly limit from 5,000 pounds NEW to 20,000 pounds NEW and increase the daily limit from 200 pounds NEW to 325 pounds NEW at Picatinny Arsenal. The Proposed Action would not result in a significant impact to the natural or human environment. Based on this finding, preparation of an Environmental Impact Statement is not warranted and this Finding of No Significant Impact is prepared.

Public Review

The deadline for public comment on this Proposed Action or to submit a request for further information is 30 days from the date of public notification of this FNSI. Any comments on the Environmental Assessment Addendum should be directed to the following address, within 30 days of the date of publication of this notice: U.S. Army Armament Research and Development Center, Attention: Public Affairs Office, Picatinny Arsenal, NJ 07806.

APPENDIX A

Draft Open Burning, Open Detonation, and Detonation Chamber RCRA Units Risk Assessment

April 2012

APPENDIX B

Draft Cumulative Risk Evaluation for Picatinny Arsenal

April 2012

Cumulative Risk Evaluation for Picatinny Arsenal

1.0 Introduction

This Report estimates cumulative cancer risks and non-cancer hazards from all documented Resource Conservation and Recovery Act (RCRA) and non-RCRA air emission sources at Picatinny Arsenal, New Jersey, as requested by NJDEP in their comments on the Open Detonation (OD) Risk Assessment Work Plan (Shaw, 2011a). The four (4) RCRA Units considered in this evaluation include the OD Area, the Open Burning (OB) Ground, the Contained Detonation Chamber (CDC), and the Explosive Waste Incinerator (EWI). The non-RCRA Units considered include numerous sources, such as firing ranges (Research, Development, Test and Evaluation ranges), boilers, and other sources on the Arsenal.

2.0 Approach

Several different approaches were used in estimating cumulative risks and hazards, due to the inherent differences in the emission sources and the regulatory programs these sources are managed under. The RCRA Units are regulated under the RCRA program and receive Part B Subpart X or Subpart O operating permits, while the non-RCRA sources are regulated under the National Environmental Policy Act (NEPA).

Estimated risks and hazards for OB, OD, and CDC emissions were obtained from Shaw (2011b).

Estimated EWI risks and hazards (for adult and child fishers, and off-site adult and child farmers and off-site adult and child residents) were obtained from Shaw (2009). It is important to note that EWI emissions were conservatively based on an assumed continuous operation schedule (i.e., 400 lbs NEW per hour, 24 hours per day, 365 days per year, or 3,504,000 lbs/yr).

However, the current New Jersey Air Permit Treatment Limit for the EWI is 57,600 lbs NEW per year. Therefore, EWI risks and hazards presented in Shaw (2009) represent an overestimation of approximately 61-fold. Estimated EWI risks and hazards for on-site receptors (including on-site residents and on-site office workers) were estimated using modeled chemical air concentrations at these receptor locations and scaling the results using risk-based Regional Screening Level (RSL) residential air concentrations (USEPA, 2011), as shown in **Tables 1a** and **1b**. Estimated EWI risks and hazards for other off-site receptors (including hypothetical off-site residents near the EWI, OB/CDC, and OD Units) were estimated using modeled chemical air concentrations at these receptor locations and scaling the results using risk-based RSL residential air concentrations (USEPA, 2011), as shown in **Tables 1c, 1d, and 1d**. As modeled EWI air concentrations at the two on-site child development centers were not captured during the dispersion modeling performed for the Shaw (2009) Risk Assessment (as these two receptor locations were not identified by NJDEP in 2009), risks and hazards for the two child development center receptor locations were based on results for other modeled locations, and scaling these results using distances from the EWI to these receptor locations. Distances and air concentration scaling factors for the child development centers were obtained from chemical

contour plots (Figures 2 through 6 presented in Shaw, 2010). It should be noted that on-site EWI risks and hazards were not estimated in Shaw (2009) as on-site receptors were not included in the NJDEP-approved EWI Risk Assessment Work Plan (Shaw, 2005).

Estimated risks and hazards for non-RCRA emissions were calculated by Shaw using modeled air concentrations from AECOM (2011), and scaling the results using risk-based RSL residential air concentrations (USEPA, 2011), as shown in **Table 2**.

RCRA sources and selected receptor locations are shown in **Figure 1**. Non-RCRA sources are located throughout the Arsenal and are shown and discussed in AECOM (2011).

3.0 Results

Based on the approaches described in Section 2.0, estimated cancer risks and noncancer hazards are presented in **Tables 3** and **4**, respectively, for the emission sources and each receptor, and summed by receptor. Receptors evaluated included the following:

- Adult Fisher (watershed exposure)
- Child Fisher (watershed exposure)
- On-site Receptors at the Child Development Center on Buffington Road
- On-site Receptors at the Child Development Center situated in the northeast quadrant
- On-site Adult Resident at on-base housing
- On-site Adult Worker at on-base office area
- Off-site Adult Farmer situated near the EWI at Facility boundary
- Off-site Child Farmer situated near the EWI at Facility boundary
- Off-site Adult Resident situated near the EWI at Facility boundary
- Off-site Child Resident situated near the EWI at Facility boundary
- Off-site Adult Resident situated near the OB/CDC Units at Facility boundary
- Off-site Child Resident situated near the OB/CDC Units at Facility boundary
- Off-site Adult Resident situated near the OD Unit at Facility boundary
- Off-site Child Resident situated near the OD Unit at Facility boundary

It should be noted that as some receptor risks and hazards were estimated by scaling modeled air concentrations with USEPA (2011) RSLs (Section 2.0), and the RSLs for residential air are based on a composite adult/child receptor, these scaled results represent risks and hazards for both adult and child receptors.

As shown in **Table 3**, the receptor with the greatest cumulative cancer risk was the adult fisher, with an estimated risk of 4.1E-6. For non-cancer hazards, the receptor with the greatest cumulative non-cancer hazard was a receptor at the Child Development Center located in the northeast quadrant of the Arsenal, with an estimated hazard of 0.45.

Per the *Guidance on Risk Assessment for Air Contaminant Emissions* (NJDEP, 2009), facilities with total cancer risks less than or equal to 1E-5 are considered negligible and no additional permit action is necessary. Similarly, if the hazard quotient for each noncarcinogen is less than or equal to 1, then the hazard is considered negligible and there is no restriction on issuing either a new or modified Pre-Construction Permit or an Operating Permit.

As the cumulative cancer risks and non-cancer hazards for Picatinny Arsenal are less than 1E-5 and less than 1, respectively, risks and hazards are deemed negligible and therefore acceptable.

4.0 Assessment for Lead

Lead is assessed separately from other chemicals, as it has no published USEPA toxicity factors for cancer or non-cancer endpoints (USEPA, 2012). The potential risks associated with residential child exposures to lead are typically addressed using the Integrated Exposure Uptake Biokinetic (IEUBK) Lead Model for Windows® (USEPA, 2010). The IEUBK model was designed to provide predictions of the probability of elevated blood lead levels for children. This model addresses three components of environmental risk assessments: the multimedia nature of exposures to lead, lead pharmacokinetics, and significant variability in exposure and risk, through estimation of probability distributions of blood lead levels for children exposed to similar environmental concentrations. The model output includes probability distribution and density plots, predicted geometric mean blood lead levels, and the percentages of the population potentially experiencing concentrations above 10 µg/dL (below which adverse effects are not expected). Lead hazards are considered unacceptable if the child-blood lead level for more than 5 percent of children is estimated to equal or exceed the Centers for Disease Control and Prevention concern threshold of 10 micrograms per deciliter (µg/dL). IEUBK model inputs may include lead concentrations in air, soil, drinking water, and food.

For the EWI, Shaw (2009) stated that the annual maximum exposed individual (MEI) air concentration was 1.0E-4 ug/m³ and as this concentration was more than four orders of magnitude lower than the National Primary and Secondary Air Quality Standards, it was concluded that lead in air did not pose an unacceptable health threat for this RCRA Unit.

For the OB, OD, and CDC RCRA emissions, the three-month rolling average MEI air concentrations for lead were 2E-4, 4E-6, and 5E-6 ug/m³ (Shaw, 2011b) which were orders of magnitude below the National Ambient Air Quality Standard (NAAQS) of 0.15 ug/m³. Therefore, the Risk Assessment concluded that lead in air did not pose an unacceptable health threat for these RCRA Units.

For the non-RCRA sources, for the sensitive receptor locations, the maximum modeled annual air concentration was 3.5E-3 ug/m³ and the maximum modeled monthly air concentration was

2.2E-2 ug/m³ (AECOM, 2011). Both of these concentrations are considerably below the three-month NAAQS of 0.15 ug/m³.

Based on these very low modeled lead concentrations, the cumulative concentration of lead is not a concern for RCRA and non-RCRA Units at the Arsenal. Based on this finding, the IEUBK Lead model for children was not run.

5.0 Uncertainties

There are numerous conservative assumptions that were employed in the RCRA risk assessments and in the non-RCRA emission estimates and risk evaluation. For the EWI Risk Assessment, one of the more conservative assumptions was the use of the MEI receptor location for the fisher receptor, and not the average deposition over the entire watershed area. As the greatest estimated cancer risk for EWI emissions was for the adult fisher (4.1E-6; Section 3.0), this conservative approach overestimated the risk by a considerable amount.

It should also be noted that for the off-site adult farmer, the EWI Risk Assessment (Shaw, 2009) recommended the use of second iteration modeled results, because the estimated cancer risk for dibenzo(ah)anthracene during the first iteration calculations slightly exceeded the 1E-6 threshold (i.e., 4E-6). (This second iteration result has been used herein; Table 3). The second iteration methodology involved reducing the exposure duration for the adult farmer from 40 years to 9 years, where this lower duration is equivalent to a central tendency exposure value. This reduction was taken in Shaw (2009) to compensate for an overly conservative biotransfer factor for this chemical for the beef and milk pathways. It should be noted that the overly conservative biotransfer factor for polycyclic aromatic hydrocarbons is discussed in further detail in Section 8.1.1 of Shaw (2011b).

If the EWI first iteration result of 4E-6 had been used in the cumulative risk evaluation, the total cancer risk would have increased from 2.4E-6 to 6.2E-6. However, as this estimated cancer risk is still below the total cancer threshold of 1E-5 (Section 3.0), overall conclusions would not change.

As mentioned previously, the EWI Risk Assessment assumed continuous operation (3,504,000 lbs NEW/yr), whereas the current New Jersey Air Permit only allows 57,600 lbs NEW per year. Therefore, EWI risks and hazards were overestimated by a factor of approximately 61-fold, and cumulative risks and hazards that are primarily from the EWI have been greatly overestimated.

6.0 References

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http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm

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TABLES

**Table 1a. Modeling Results
Proposed Combined On-Site Residential Receptor Location**

Pollutant Description	Status	Annual ME Conc		Residential RSL (1E-6 Risk Target)	Residential RSL (1.0 Hazard Target)	Estimated Cancer Risk	Estimated Non-Cancer Hazard	Notes
		ug/m³	ug/m³					
<i>Inorganics (COPCs from Table 4-B)</i>								
Aluminum	COPC	3.52E-06	NVA	5.20E+00	NVA	6.76E-07		
Antimony	COPC	6.96E-06	NVA	2.10E-01	NVA	3.31E-05	Antimony trioxide	
Arsenic	COPC	2.58E-05	5.70E-04	1.60E-02	4.53E-08	1.81E-03		
Barium	COPC	2.82E-06	NVA	5.20E-01	NVA	5.42E-06		
Beryllium	COPC	2.58E-05	1.00E-03	2.10E-02	2.58E-08	1.23E-03		
Cadmium	COPC	3.19E-05	1.40E-03	2.10E-02	2.28E-08	1.52E-03		
Chromium	COPC	2.58E-05	NVA	NVA	NVA			
Chromium (Hexavalent)	COPC	2.58E-06	1.10E-05	1.00E-01	2.35E-07	2.58E-05		
Cobalt	COPC	3.32E-06	2.70E-04	6.30E-03	1.23E-02	5.27E-04		
Copper	COPC	3.19E-07	NVA	NVA	NVA			
Lead	COPC	3.19E-05	NVA	NVA	NVA			Use Lead model
Magnesium	COPC	6.30E-06	NVA	NVA	NVA			
Manganese	COPC	2.42E-06	NVA	5.20E-02	NVA	4.65E-05		
Mercury	COPC	1.20E-05	NVA	3.10E-02	NVA	3.88E-04		
Nickel	COPC	3.98E-07	9.40E-03	9.40E-02	4.24E-11	4.24E-06		
Selenium	COPC	1.84E-07	NVA	2.10E+01	NVA	8.75E-09		
Silver	COPC	1.34E-07	NVA	NVA	NVA			
Thallium	COPC	9.19E-08	NVA	NVA	NVA			
Tin	COPC	5.97E-06	NVA	NVA	NVA			
Zinc	COPC	9.89E-07	NVA	NVA	NVA			
Hydrogen Chloride	COPC	4.53E-04	NVA	2.10E+01	NVA	2.18E-05		
Chlorine Gas	COPC	6.15E-06	NVA	1.50E-01	NVA	4.10E-05		
Bromine Gas	COPC	2.38E-05	NVA	NVA	NVA			
<i>VOCs (COPCs and COPC-Q from Table 4-2)</i>								
Acetone	COPC	1.25E-03	NVA	3.20E+04	NVA	3.90E-08		
Acetonitrile	COPC	8.08E-04	NVA	6.30E+01	NVA	1.28E-05		
Benzene	COPC	1.25E-04	3.10E-01	3.10E+01	4.04E-10	4.04E-06		
Bromodichloromethane	COPC	1.31E-06	6.60E-02	NVA	1.98E-11	NVA		
Bromomethane	COPC	4.80E-06	NVA	5.20E+00	NVA	9.24E-07		
2-Butanone, Methyl ethyl ketone (MEK)	COPC	1.13E-04	NVA	5.20E+03	NVA	2.18E-08		
Carbon tetrachloride	COPC	2.30E-06	4.10E-01	1.00E+02	5.60E-12	2.30E-08		
Chlorodibromomethane	COPC	1.18E-06	9.00E-02	NVA	1.32E-11	NVA		
Chloroform	COPC	8.02E-06	1.10E-01	1.00E+02	7.29E-11	8.02E-08		
1,1-Dichloroethane	COPC	8.71E-07	1.50E+00	NVA	5.80E-13	NVA		
1,2-Dichloroethane (EDC)	COPC	1.08E-04	9.40E-02	7.30E+00	1.15E-09	1.49E-05		
Diethyl ether (ethyl ether)	COPC	6.16E-04	NVA	NVA	NVA			
Ethyl acetate	COPC	1.37E-04	NVA	NVA	NVA			
Ethylbenzene	COPC	9.16E-07	9.70E-01	1.00E+03	9.45E-13	9.16E-10		
Ethylene dibromide	COPC	9.18E-07	NVA	NVA	NVA			
Methane	COPC-Q	1.48E-03	NVA	NVA	NVA			
Methylene chloride	COPC	2.55E-03	5.20E+00	1.10E+03	4.91E-10	2.32E-06		
Styrene	COPC	1.37E-06	NVA	1.00E+03	NVA	1.37E-09		
1,1,2,2-Tetrachloroethane	COPC	1.14E-06	4.20E-02	NVA	2.72E-11	NVA		
Tetrachloroethene	COPC	1.60E-06	4.10E-01	2.80E+02	3.90E-12	5.72E-09		
Toluene	COPC	2.94E-05	NVA	5.20E+03	NVA	5.65E-09		
1,1,1-Trichloroethane	COPC	9.16E-07	NVA	5.20E+03	NVA	1.76E-10		
1,1,2-Trichloroethane	COPC	1.60E-06	1.50E-01	2.10E-01	1.07E-11	7.62E-06		
Trichloroethene (Trichloroethylene)	COPC	1.61E-04	4.30E-01	2.10E+00	3.75E-10	7.67E-05		
m,p-Xylenes	COPC	1.95E-06	NVA	1.00E+02	NVA	1.95E-08		
Cyclopentane, methyl (TIC)	COPC-Q	8.94E-06	NVA	NVA	NVA			
Hexane (TIC)	COPC-Q	6.24E-05	NVA	7.30E+02	NVA	8.54E-08		
1-Pentene, 2-methyl (TIC)	COPC-Q	3.44E-07	NVA	NVA	NVA			
Benzaldehyde (TIC)	COPC-Q	2.40E-06	NVA	NVA	NVA			
Benzonitrile (TIC)	COPC-Q	9.15E-07	NVA	NVA	NVA			
Benzoic Acid (TIC)	COPC	1.58E-05	NVA	NVA	NVA			
<i>SVOCs (COPCs and COPC-Q from Table 4-2)</i>								
Benzo(a)anthracene	COPC	2.30E-07	8.70E-03	NVA	2.64E-11	NVA		
Benzo(b)fluoranthene	COPC	2.30E-07	8.70E-03	NVA	2.64E-11	NVA		
Benzo(k)fluoranthene	COPC	2.87E-07	8.70E-03	NVA	3.30E-11	NVA		
Benzo(g,h,i)perylene	COPC	2.30E-07	NVA	NVA	NVA			
Benzo(a)pyrene	COPC	2.37E-07	8.70E-04	NVA	3.30E-10	NVA		
Bis (2-Ethylhexyl)-phthalate	COPC	1.72E-06	1.00E+00	NVA	1.72E-12	NVA		
Chrysene	COPC	2.30E-07	8.70E-02	NVA	2.64E-12	NVA		
Dibenzo(a,h)anthracene	COPC	2.30E-07	8.00E-04	NVA	2.87E-10	NVA		
Di-n-butyl phthalate	COPC	1.95E-05	NVA	NVA	NVA			
1,2-Dichlorobenzene	COPC	1.15E-06	NVA	2.10E+02	NVA	5.48E-09		
1,4-Dichlorobenzene	COPC	1.15E-06	2.20E-01	8.30E+02	5.23E-12	1.39E-09		
Diethyl phthalate	COPC	5.75E-07	NVA	NVA	NVA			
Dimethyl phthalate	COPC	5.75E-07	NVA	NVA	NVA			
2,4-Dinitrotoluene	COPC	1.14E-04	2.70E-02	NVA	4.24E-09	NVA		
Di-n-octyl phthalate	COPC	9.58E-07	NVA	NVA	NVA			
Diphenylamine	COPC	3.54E-05	NVA	NVA	NVA			
Indeno[1,2,3-cd]pyrene	COPC	3.45E-07	8.70E-03	NVA	3.67E-11	NVA		
Naphthalene	COPC	3.45E-07	7.20E-02	3.10E+00	4.79E-12	1.11E-07		
Phenanthrene	COPC-Q	2.48E-07	NVA	NVA	NVA			
Phenol	COPC	1.15E-06	NVA	2.10E+02	NVA	5.48E-09		
(Z),9,17-Octacecadien (TIC)	COPC-Q	2.51E-06	NVA	NVA	NVA			
1,3,5,7-Cyclooctatetraene (TIC)	COPC-Q	2.19E-06	NVA	NVA	NVA			
1,4,3,6-Dianhydro-alpha-d-glucopyranose (TIC)	COPC-Q	4.21E-06	NVA	NVA	NVA			
1-ethenyl-4-ethylbenzene (TIC)	COPC-Q	3.93E-06	NVA	NVA	NVA			
1-methyl-2-(propenyl) benzene (TIC)	COPC-Q	9.42E-06	NVA	NVA	NVA			
1-Octadecene (TIC)	COPC-Q	1.46E-06	NVA	NVA	NVA			
2,5-dimethyl furan (TIC)	COPC-Q	5.12E-06	NVA	NVA	NVA			
2,6-dimethyl heptane (TIC)	COPC-Q	3.47E-06	NVA	NVA	NVA			
2-fluoro-6-nitrophenol (TIC)	COPC-Q	1.27E-06	NVA	NVA	NVA			
2-hexanone (TIC)	COPC-Q	2.57E-06	NVA	3.10E+01	NVA	8.28E-08		
2-methyl octane (TIC)	COPC-Q	6.17E-06	NVA	NVA	NVA			
2-methyl-3-propyl dodecane (TIC)	COPC-Q	2.09E-06	NVA	NVA	NVA			
Benzaldehyde (TIC)	COPC-Q	2.72E-06	NVA	2.00E+02	NVA	NVA		
Cyclohexanone (TIC)	COPC-Q	1.19E-06	NVA	7.30E+02	NVA	1.63E-09		
Ethyl benzoic acid (TIC)	COPC-Q	8.87E-06	NVA	NVA	NVA			
Hexadecanoic acid (TIC)	COPC-Q	2.19E-06	NVA	NVA	NVA			
Styrene (TIC)	COPC-Q	5.31E-06	NVA	1.00E+03	NVA	5.31E-09		
Tetradecanoic acid (TIC)	COPC-Q	1.13E-06	NVA	NVA	NVA			
Undecyclopentane (TIC)	COPC-Q	1.20E-06	NVA	NVA	NVA			
<i>PCDD/PCDF (COPCs and COPC-Q From Table 4-2)</i>								
2,3,7,8-TCDD (TEQ)	COPC	6.91E-11	6.40E-08	4.20E-05	1.08E-09	1.65E-06		
2,3,7,8-TCDD	COPC	2.96E-12	NVA	NVA	NVA	NVA	Used Total TEQ	

Pollutant Description	Status			Residential RSL (1.0 Hazard Target)	Estimated Cancer Risk	Estimated Non-Cancer Hazard	Notes
		Annual MEI Conc	Residential RSL (1E-6 Risk Target)				
		ug/m³	ug/m³				
Other TCDD	COPC	4.71E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8-PeCDD	COPC	1.38E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Other PeCDD	COPC	5.16E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8-HxCDD	COPC	1.22E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,6,7,8-HxCDD	COPC	1.95E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8,9-HxCDD	COPC	2.07E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Other HxCDD	COPC	3.79E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,6,7,8-HpCDD	COPC	5.44E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Other HpCDD	COPC	7.18E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Total OCDD	COPC	3.09E-11	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,7,8-TCDF	COPC	1.80E-10	NVA	NVA	NVA	NVA	Used Total TEQ
Other TCDF	COPC	9.47E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8-PeCDF	COPC	2.77E-11	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,4,7,8-PeCDF	COPC	5.22E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Other PeCDF	COPC	6.73E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8-HxCDF	COPC	4.02E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,8,7,8-HxCDF	COPC	1.78E-11	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,4,6,7,8-HxCDF	COPC	1.86E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8,9-HxCDF	COPC	1.52E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Other HxCDF	COPC	1.31E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,6,7-HpCDF	COPC	2.86E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8,9-HpCDF	COPC	2.75E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Other HpCDF	COPC	9.98E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Total OCDF	COPC	2.32E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Explosives (COPC-Q from Table 4-7)							
1,3,5-Trinitro-1,3,5-triazine (RDX)	COPC-Q	2.32E-06	NVA	NVA	NVA	NVA	
Trinitrotoluene (TNT)	COPC-Q	4.60E-06	NVA	NVA	NVA	NVA	
Cyclotetramethylene-tetranitramine (HMX)	COPC-Q	2.32E-06	NVA	NVA	NVA	NVA	
Nitroguanidine (NG)	COPC-Q	2.32E-06	NVA	NVA	NVA	NVA	
Nitrocellulose (NC), Cellulose nitrate	COPC-Q	2.32E-06	NVA	NVA	NVA	NVA	
Nitroglycerine (NG)	COPC-Q	2.32E-06	NVA	NVA	NVA	NVA	
Other Sources (COPCs from Table 4-5 and 4-6)							
Ethanol	COPC	2.96E-04	NVA	NVA	NVA	NVA	
Methanol	COPC	1.22E-04	NVA	4.20E+03	NVA	2.91E-08	
Tetrahydrofuran	COPC	1.52E-04	NVA	NVA	NVA	NVA	
					3.5E-07	0.00558	

**Table 1b. Modeling Results
Proposed Combined On-Site Office Workers Receptor Location**

Pollutant Description	Status	Annual MEI	Residential RSL (1-E-6 Risk Target)	Residential RSL (1.0 Hazard Target)	Estimated Cancer Risk	Estimated Non-Cancer Hazard	Notes
		Conc	ug/m³	ug/m³			
Inorganics (COPCs from Table 4-8)							
Aluminum	COPC	7.69E-07	NVA	5.20E+00	NVA	1.48E-07	
Antimony	COPC	1.52E-06	NVA	2.10E-01	NVA	7.24E-06	Antimony trioxide
Arsenic	COPC	5.65E-06	5.70E-04	1.60E-02	9.90E-09	3.53E-04	
Barium	COPC	6.17E-07	NVA	5.20E-01	NVA	1.19E-06	
Beryllium	COPC	5.65E-06	1.00E-03	2.10E-02	5.65E-09	2.69E-04	
Cadmium	COPC	6.98E-06	1.40E-03	2.10E-02	4.98E-08	3.32E-04	
Chromium	COPC	5.65E-06	NVA	NVA	NVA	NVA	
Chromium (Hexavalent)	COPC	5.65E-07	1.10E-05	1.00E-01	5.13E-08	5.65E-06	
Cobalt	COPC	7.26E-07	2.70E-04	6.30E-03	2.68E-09	1.15E-04	
Copper	COPC	6.97E-08	NVA	NVA	NVA	NVA	
Lead	COPC	6.98E-06	NVA	NVA	NVA	NVA	Use Lead model
Magnesium	COPC	1.38E-06	NVA	NVA	NVA	NVA	
Manganese	COPC	5.20E-07	NVA	5.20E-02	NVA	1.02E-05	
Mercury	COPC	2.62E-06	NVA	3.10E-02	NVA	8.45E-05	
Nickel	COPC	8.71E-08	9.40E-03	9.40E-02	9.28E-12	9.26E-07	
Selenium	COPC	4.02E-08	NVA	2.10E+01	NVA	1.91E-09	
Silver	COPC	2.92E-08	NVA	NVA	NVA	NVA	
Thallium	COPC	2.01E-08	NVA	NVA	NVA	NVA	
Tin	COPC	1.30E-06	NVA	NVA	NVA	NVA	
Zinc	COPC	2.16E-07	NVA	NVA	NVA	NVA	
Hydrogen Chloride	COPC	9.90E-05	NVA	2.10E+01	NVA	4.71E-06	
Chlorine Gas	COPC	1.34E-06	NVA	1.50E-01	NVA	8.97E-06	
Bromine Gas	COPC	5.21E-06	NVA	NVA	NVA	NVA	
VOCs (COPCs and COPC-Q from Table 4-2)							
Acetone	COPC	4.60E-04	NVA	3.20E+04	NVA	1.44E-08	
Acetonitrile	COPC	4.51E-04	NVA	6.30E+01	NVA	7.16E-06	
Benzene	COPC	6.70E-05	3.10E-01	3.10E+01	2.16E-10	2.16E-06	
Bromodichloromethane	COPC	2.86E-07	6.60E-02	NVA	4.33E-12	NVA	
Bromomethane	COPC	1.05E-06	NVA	5.20E+00	NVA	2.02E-07	
2-Butanone, Methyl ethyl ketone (MEK)	COPC	6.13E-05	NVA	5.20E+03	NVA	1.18E-08	
Carbon tetrachloride	COPC	5.02E-07	4.10E-01	1.00E+02	1.22E-12	5.02E-09	
Chlorodibromomethane	COPC	2.59E-07	9.00E-02	NVA	2.88E-12	NVA	
Chloroform	COPC	1.75E-08	1.10E-01	1.00E+02	1.59E-11	1.75E-08	
1,1-Dichloroethane	COPC	1.90E-07	1.50E+00	NVA	1.27E-13	NVA	
1,2-Dichloroethane (EDC)	COPC	6.04E-05	9.40E-02	7.30E+00	6.42E-10	8.27E-06	
Diethyl ether (ethyl ether)	COPC	3.40E-04	NVA	NVA	NVA	NVA	
Ethyl acetate	COPC	7.30E-05	NVA	NVA	NVA	NVA	
Ethylbenzene	COPC	2.00E-07	9.70E-01	1.00E+03	2.07E-13	2.00E-10	
Ethylenedibromide	COPC	2.00E-07	NVA	NVA	NVA	NVA	
Methane	COPC-Q	3.19E-04	NVA	NVA	NVA	NVA	
Methylene chloride	COPC	7.49E-04	5.20E+00	1.10E+03	1.44E-10	6.81E-07	
Styrene	COPC	3.00E-07	NVA	1.00E+03	NVA	3.00E-10	
1,1,2,2-Tetrachloroethane	COPC	2.50E-07	4.20E-02	NVA	5.95E-12	NVA	
Tetrachloroethene	COPC	3.50E-07	4.10E-01	2.80E+02	8.54E-13	1.25E-09	
Toluene	COPC	6.42E-06	NVA	5.20E+03	NVA	1.24E-09	
1,1,1-Trichloroethane	COPC	2.00E-07	NVA	5.20E+03	NVA	3.85E-11	
1,1,2-Trichloroethane	COPC	3.50E-07	1.50E-01	2.10E-01	2.33E-12	1.67E-06	
Trichloroethene (Trichloroethylene)	COPC	9.00E-05	4.30E-01	2.10E+00	2.09E-10	4.28E-05	
m+p-Xylenes	COPC	4.26E-07	NVA	1.00E+02	NVA	4.26E-09	
Cyclopentane, methyl (TIC)	COPC-Q	1.95E-06	NVA	NVA	NVA	NVA	
Hexane (TIC)	COPC-Q	1.36E-05	NVA	7.30E+02	NVA	1.87E-08	
1-Pentene, 2-methyl (TIC)	COPC-Q	7.52E-08	NVA	NVA	NVA	NVA	
Benzaldehyde (TIC)	COPC-Q	5.25E-07	NVA	NVA	NVA	NVA	
Benzonitrile (TIC)	COPC-Q	2.00E-07	NVA	NVA	NVA	NVA	
Benzoic Acid (TIC)	COPC	3.45E-06	NVA	NVA	NVA	NVA	
SVOCs (COPCs and COPC-Q from Table 4-2)							
Benzo(a)anthracene	COPC	5.03E-08	8.70E-03	NVA	5.78E-12	NVA	
Benzo(b)fluoranthene	COPC	5.03E-08	8.70E-03	NVA	5.78E-12	NVA	
Benzo(k)fluoranthene	COPC	6.29E-08	8.70E-03	NVA	7.22E-12	NVA	
Benzo(gh)perylene	COPC	5.03E-08	NVA	NVA	NVA	NVA	
Benzo(e)pyrene	COPC	6.29E-08	8.70E-04	NVA	7.22E-11	NVA	
Bis (2-Ethylhexyl)-phthalate	COPC	3.77E-07	1.00E+00	NVA	3.77E-13	NVA	
Chrysene	COPC	5.03E-08	8.70E-02	NVA	5.78E-13	NVA	
Dibenz(a,h)anthracene	COPC	5.03E-08	8.00E-04	NVA	6.28E-11	NVA	
Di-n-butyl phthalate	COPC	7.97E-06	NVA	NVA	NVA	NVA	
1,2-Dichlorobenzene	COPC	2.51E-07	NVA	2.10E+02	NVA	1.20E-09	
1,4-Dichlorobenzene	COPC	2.51E-07	2.20E-01	8.30E+02	1.14E-12	3.03E-10	
Diethyl phthalate	COPC	1.26E-07	NVA	NVA	NVA	NVA	
Dimethyl phthalate	COPC	1.26E-07	NVA	NVA	NVA	NVA	
2,4-Dinitrotoluene	COPC	7.18E-05	2.70E-02	NVA	2.56E-09	NVA	
Di-n-octyl phthalate	COPC	2.10E-07	NVA	NVA	NVA	NVA	
Diphenylamine	COPC	1.16E-05	NVA	NVA	NVA	NVA	
Indeno[1,2,3-cd]pyrene	COPC	7.54E-08	8.70E-03	NVA	8.67E-12	NVA	
Naphthalene	COPC	7.54E-08	7.20E-02	3.10E+00	1.05E-12	2.43E-08	
Phenanthrene	COPC-Q	5.41E-08	NVA	NVA	NVA	NVA	
Phenol	COPC	2.51E-07	NVA	2.10E+02	NVA	1.20E-09	
(Z) 9,17-Ocadienoic acid (TIC)	COPC-Q	5.50E-07	NVA	NVA	NVA	NVA	
1,3,5,7-Cyclooctatetraene (TIC)	COPC-Q	4.78E-07	NVA	NVA	NVA	NVA	
1,4,3,6-Dianhydro-alpha,-beta-d-glucopyranose (TIC)	COPC-Q	9.21E-07	NVA	NVA	NVA	NVA	
1-ethenyl-4-ethylbenzene (TIC)	COPC-Q	8.59E-07	NVA	NVA	NVA	NVA	
1-methyl-2-(2-propenyl) benzene (TIC)	COPC-Q	2.06E-06	NVA	NVA	NVA	NVA	
1-Octadecane (TIC)	COPC-Q	3.20E-07	NVA	NVA	NVA	NVA	
2,5-dimethyl furan (TIC)	COPC-Q	1.12E-06	NVA	NVA	NVA	NVA	
2,6-dimethyl heptane (TIC)	COPC-Q	7.59E-07	NVA	NVA	NVA	NVA	
2-fluoro-6-nitrophenol (TIC)	COPC-Q	2.77E-07	NVA	NVA	NVA	NVA	
2-hexanone (TIC)	COPC-Q	5.82E-07	NVA	3.10E+01	NVA	1.81E-08	
2-methyl octane (TIC)	COPC-Q	1.35E-06	NVA	NVA	NVA	NVA	
2-methyl-6-propyl dodecane (TIC)	COPC-Q	4.58E-07	NVA	NVA	NVA	NVA	
Benzaldehyde (TIC)	COPC-Q	5.94E-07	NVA	NVA	NVA	NVA	
Cyclohexanone (TIC)	COPC-Q	2.60E-07	NVA	7.30E+02	NVA	3.56E-10	
Ethyl benzolic acid (TIC)	COPC-Q	1.94E-06	NVA	NVA	NVA	NVA	
Hexadecanoic acid (TIC)	COPC-Q	4.78E-07	NVA	NVA	NVA	NVA	
Styrene (TIC)	COPC-Q	1.18E-06	NVA	1.00E+03	NVA	1.16E-09	
Tetradecanoic acid (TIC)	COPC-Q	2.48E-07	NVA	NVA	NVA	NVA	
Undecylpentane (TIC)	COPC-Q	2.62E-07	NVA	NVA	NVA	NVA	
PCDD/PCDF (COPCs and COPC-Q From Table 4-2)							
2,3,7,8-TCDD (TEQ)	COPC	1.51E-11	6.40E-08	4.20E-05	2.36E-10	3.60E-07	
2,3,7,8-TCDD	COPC	6.48E-13	NVA	NVA	NVA	NVA	Used Total TEQ

Pollutant Description	Status	Annual MEI Conc	Residential	Residential RSL (1.0 Hazard Target)	Estimated Cancer Risk	Estimated Non-Cancer Hazard	Notes
			ug/m ³				
Other -TCDD	COPC	1.03E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8 -PeCDD	COPC	3.01E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Other PeCDD	COPC	1.13E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8 -HxCDD	COPC	2.66E-12	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,6,7,8 -HxCDD	COPC	4.26E-12	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8,9 -HxCDD	COPC	4.54E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Other HxCDD	COPC	8.29E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,8,7,8 -HpCDD	COPC	1.19E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Other HpCDD	COPC	1.57E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Total OCDD	COPC	6.75E-12	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,7,8 -TCDF	COPC	3.94E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Other TCDF	COPC	2.07E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8 -PeCDF	COPC	6.06E-12	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,4,7,8 -PeCDF	COPC	1.14E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Other PeCDF	COPC	1.47E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8 -HxCDF	COPC	8.80E-12	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,6,7,8 -HxCDF	COPC	3.89E-12	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,4,6,7,8 -HxCDF	COPC	3.62E-12	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8,9 -HxCDF	COPC	3.33E-13	NVA	NVA	NVA	NVA	Used Total TEQ
Other HxCDF	COPC	2.87E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,6,7,8 -HpCDF	COPC	5.82E-12	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8,9 -HpCDF	COPC	6.01E-13	NVA	NVA	NVA	NVA	Used Total TEQ
Other HpCDF	COPC	2.18E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Total OCDF	COPC	5.08E-13	NVA	NVA	NVA	NVA	Used Total TEQ
<i>Explosives (COPC-Q from Table 4-7)</i>							
1,3,5-Trinitro-1,3,5-mazine (RDX)	COPC-Q	5.07E-07	NVA	NVA	NVA	NVA	
Trinitrotoluene (TNT)	COPC-Q	1.48E-06	NVA	NVA	NVA	NVA	
Cyclotetramethylene-tetranitramine (HMX)	COPC-Q	5.07E-07	NVA	NVA	NVA	NVA	
Nitroguanidine (NG)	COPC-Q	5.07E-07	NVA	NVA	NVA	NVA	
Nitrocellulose (NC), Cellulose nitrate	COPC-Q	5.07E-07	NVA	NVA	NVA	NVA	
Nitroglycerine (NG)	COPC-Q	5.07E-07	NVA	NVA	NVA	NVA	
<i>Other Sources (COPCs from Table 4-5 and 4-6)</i>							
Ethanol	COPC	1.61E-04	NVA	NVA	NVA	NVA	
Methanol	COPC	6.82E-05	NVA	4.20E+03	NVA	1.62E-08	
Tetrahydrofuran	COPC	8.49E-05	NVA	NVA	NVA	NVA	
					7.9E-08	0.00126	

Table 1c. Modeling Results
Proposed Off-Site Residential Receptor Location for EWI (updated for actual maximum location 1/26/10)

Pollutant Description	Status	Annual MEI Conc	Residential RSL (1.E-6 Risk Target)	Residential RSL (1.0 Hazard Target)	Estimated Cancer Risk	Estimated Non-Cancer Hazard	Notes
		ug/m ³	ug/m ³	ug/m ³			
<i>Inorganics (COPCs from Table 4-8)</i>							
Aluminum	COPC	1.18E-05	NVA	5.20E+00	NVA	2.27E-06	
Antimony	COPC	2.34E-05	NVA	2.10E-01	NVA	1.11E-04	Antimony trioxide
Arsenic	COPC	8.88E-05	5.70E-04	1.80E-02	1.52E-07	5.43E-03	
Barium	COPC	9.44E-06	NVA	5.20E-01	NVA	1.82E-05	
Beryllium	COPC	8.68E-05	1.00E-03	2.10E-02	8.68E-08	4.13E-03	
Cadmium	COPC	1.07E-04	1.40E-03	2.10E-02	7.97E-08	5.11E-03	
Chromium	COPC	8.88E-05	NVA	NVA	NVA	NVA	
Chromium (Hexavalent)	COPC	8.88E-08	1.10E-05	1.00E-01	7.89E-07	8.68E-05	See footnote for Cr
Cobalt	COPC	1.12E-05	2.70E-04	6.30E-03	4.14E-08	1.77E-03	
Copper	COPC	1.07E-06	NVA	NVA	NVA	NVA	
Lead	COPC	1.07E-04	NVA	NVA	NVA	NVA	Use Lead model
Magnesium	COPC	2.12E-05	NVA	NVA	NVA	NVA	
Manganese	COPC	8.13E-06	NVA	5.20E-02	NVA	1.58E-04	
Mercury	COPC	4.03E-05	NVA	3.10E-02	NVA	1.30E-03	
Nickel	COPC	1.34E-06	9.40E-03	9.40E-02	1.42E-10	1.42E-05	
Selenium	COPC	6.18E-07	NVA	2.10E+01	NVA	2.94E-08	
Silver	COPC	4.50E-07	NVA	NVA	NVA	NVA	
Thallium	COPC	3.08E-07	NVA	NVA	NVA	NVA	
Tin	COPC	2.01E-05	NVA	NVA	NVA	NVA	
Zinc	COPC	3.33E-06	NVA	NVA	NVA	NVA	
Hydrogen Chloride	COPC	1.52E-03	NVA	2.10E+01	NVA	7.25E-05	
Chlorine Gas	COPC	2.07E-05	NVA	1.50E-01	NVA	1.38E-04	
Bromine Gas	COPC	8.01E-05	NVA	NVA	NVA	NVA	
<i>VOCs (COPCs and COPC-Q from Table 4-2)</i>							
Acetone	COPC	3.94E-03	NVA	3.20E+04	NVA	1.23E-07	
Acetonitrile	COPC	2.58E-03	NVA	6.30E+01	NVA	4.09E-05	
Benzene	COPC	3.80E-04	3.10E-01	3.10E+01	1.28E-09	1.26E-05	
Bromodichloromethane	COPC	2.82E-06	6.60E-02	NVA	4.28E-11	NVA	
Bromomethane	COPC	1.00E-05	NVA	5.20E+00	NVA	1.93E-06	
2-Butanone, Methyl ethyl ketone (MEK)	COPC	3.62E-04	NVA	5.20E+03	NVA	6.96E-08	
Carbon tetrachloride	COPC	4.98E-08	4.10E-01	1.00E+02	1.21E-11	4.98E-08	
Chlorodibromomethane	COPC	2.47E-06	9.00E-02	NVA	2.74E-11	NVA	
Chloroform	COPC	1.73E-05	1.10E-01	1.00E+02	1.58E-10	1.73E-07	
1,1-Dichloroethane	COPC	1.88E-06	1.50E+00	NVA	1.25E-12	NVA	
1,2-Dichloroethane (EDC)	COPC	3.48E-04	9.40E-02	7.30E+00	3.88E-09	4.74E-05	
Diethyl ether (ethyl ether)	COPC	1.96E-03	NVA	NVA	NVA	NVA	
Ethyl acetate	COPC	4.26E-04	NVA	NVA	NVA	NVA	
Ethylbenzene	COPC	1.98E-06	9.70E-01	1.00E+03	2.04E-12	1.98E-09	
Ethylene dibromide	COPC	1.98E-06	NVA	NVA	NVA	NVA	
Methane	COPC-Q	3.15E-03	NVA	NVA	NVA	NVA	
Methylene chloride	COPC	8.03E-03	5.20E+00	1.10E+03	1.54E-09	7.30E-06	
Styrene	COPC	2.98E-06	NVA	1.00E+03	NVA	2.98E-09	
1,1,2,2-Tetrachloroethane	COPC	2.47E-06	4.20E-02	NVA	5.88E-11	NVA	
Tetrachloroethene	COPC	3.48E-06	4.10E-01	2.80E+02	8.43E-12	1.23E-08	
Toluene	COPC	9.88E-05	NVA	5.20E+03	NVA	1.90E-08	
1,1,1-Trichloroethane	COPC	1.98E-06	NVA	5.20E+03	NVA	3.81E-10	
1,1,2-Trichloroethane	COPC	3.41E-06	1.50E-01	2.10E-01	2.27E-11	1.62E-05	
Trichloroethene (Trichloroethylene)	COPC	5.16E-04	4.30E-01	2.10E+00	1.20E-09	2.48E-04	
m,p-Xylenes	COPC	4.21E-06	NVA	1.00E+02	NVA	4.21E-08	
Cyclopentane, methyl (TIC)	COPC-Q	1.93E-05	NVA	NVA	NVA	NVA	
Hexane (TIC)	COPC-Q	1.35E-04	NVA	7.30E+02	NVA	1.85E-07	
1-Pentene, 2-methyl (TIC)	COPC-Q	7.43E-07	NVA	NVA	NVA	NVA	
Benzaldehyde (TIC)	COPC-Q	5.01E-08	NVA	NVA	NVA	NVA	
Benzonitrile (TIC)	COPC-Q	1.91E-06	NVA	NVA	NVA	NVA	
Benzolic Acid (TIC)	COPC	3.41E-05	NVA	NVA	NVA	NVA	
<i>SVOCs (COPCs and COPC-Q from Table 4-2)</i>							
Benz(a)anthracene	COPC	5.27E-07	8.70E-03	NVA	6.06E-11	NVA	
Benz(b)fluoranthene	COPC	5.27E-07	8.70E-03	NVA	6.06E-11	NVA	
Benz(k)fluoranthene	COPC	6.59E-07	8.70E-03	NVA	7.57E-11	NVA	
Benz(gh)perylene	COPC	5.27E-07	NVA	NVA	NVA	NVA	
Benz(a)pyrene	COPC	6.59E-07	8.70E-04	NVA	7.57E-10	NVA	
Bis (2-Ethyhexyl)-phthalate	COPC	3.94E-08	1.00E+00	NVA	3.94E-12	NVA	
Chrysanthenes	COPC	5.27E-07	8.70E-02	NVA	8.06E-12	NVA	
Dibenzo(a,h)anthracene	COPC	5.27E-07	8.00E-04	NVA	6.58E-10	NVA	
Di-n-butyl phthalate	COPC	6.68E-05	NVA	NVA	NVA	NVA	
1,2-Dichlorobenzene	COPC	2.63E-06	NVA	2.10E+02	NVA	1.25E-08	
1,4-Dichlorobenzene	COPC	2.63E-06	2.20E-01	8.30E+02	1.20E-11	3.17E-09	
Diethyl phthalate	COPC	1.31E-06	NVA	NVA	NVA	NVA	
Dimethyl phthalate	COPC	1.31E-06	NVA	NVA	NVA	NVA	
2,4-Dinitrotoluene	COPC	3.72E-04	2.70E-02	NVA	1.38E-08	NVA	
Di-n-octyl phthalate	COPC	2.19E-08	NVA	NVA	NVA	NVA	
Diphenylamine	COPC	8.63E-05	NVA	NVA	NVA	NVA	
Indeno(1,2,3-cd)pyrene	COPC	7.88E-07	8.70E-03	NVA	9.06E-11	NVA	
Naphthalene	COPC	7.89E-07	7.20E-02	3.10E+00	1.10E-11	2.54E-07	
Phenanthrene	COPC-Q	8.33E-07	NVA	NVA	NVA	NVA	
Phenol	COPC	2.63E-06	NVA	2.10E+02	NVA	1.25E-08	
(Z) 9, 17-Octacacetadien (TIC)	COPC-Q	5.25E-06	NVA	NVA	NVA	NVA	
1,3,5,7-Cyclooctatetraene (TIC)	COPC-Q	4.56E-06	NVA	NVA	NVA	NVA	
1,4,3,6-Dianhydro-alpha,d-glucopyranose (TIC)	COPC-Q	9.10E-06	NVA	NVA	NVA	NVA	
1-ethoxy-4-ethylbenzene (TIC)	COPC-Q	8.49E-06	NVA	NVA	NVA	NVA	
1-methyl-2-(2-propenyl) benzene (TIC)	COPC-Q	2.04E-05	NVA	NVA	NVA	NVA	
1-Octadecane (TIC)	COPC-Q	4.82E-06	NVA	NVA	NVA	NVA	
2,5-dimethyl furan (TIC)	COPC-Q	1.07E-05	NVA	NVA	NVA	NVA	
2,6-dimethyl heptane (TIC)	COPC-Q	7.50E-06	NVA	NVA	NVA	NVA	
2-fluoro-6-nitrophenol (TIC)	COPC-Q	4.26E-06	NVA	NVA	NVA	NVA	
2-hexanone (TIC)	COPC-Q	5.36E-06	NVA	3.10E+01	NVA	1.73E-07	
2-methyl octane (TIC)	COPC-Q	1.29E-05	NVA	NVA	NVA	NVA	
2-methyl-6-propyl dodecane (TIC)	COPC-Q	4.35E-06	NVA	NVA	NVA	NVA	
Benzaldehyde (TIC)	COPC-Q	5.67E-06	NVA	NVA	NVA	NVA	
Cyclohexanone (TIC)	COPC-Q	4.00E-06	NVA	7.30E+02	NVA	5.48E-09	
Ethyl benzoic acid (TIC)	COPC-Q	1.85E-05	NVA	NVA	NVA	NVA	
Hexadecanoic acid (TIC)	COPC-Q	4.58E-06	NVA	NVA	NVA	NVA	
Styrene (TIC)	COPC-Q	1.15E-05	NVA	1.00E+03	NVA	1.15E-08	
Tetradecanoic acid (TIC)	COPC-Q	3.81E-06	NVA	NVA	NVA	NVA	
Undecyclopentane (TIC)	COPC-Q	4.02E-06	NVA	NVA	NVA	NVA	

Pollutant Description	Status				Estimated Cancer Risk	Estimated Non-Cancer Hazard	Notes
		Annual MEI Conc	Residential RSL (1E-4 Risk Target)	Residential RSL (1.0 Hazard Target)			
		ug/m ³	ug/m ³	ug/m ³			
PCDD/PCDF (COPCs and COPC-Q From Table 4-2)							
2,3,7,8-TCDD (TEQ)	COPC	2.95E-10	6.40E-08	4.20E-05	4.81E-09	7.02E-06	
2,3,7,8 -TCDD	COPC	6.19E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Other -TCDD	COPC	8.82E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8-PeCDD	COPC	2.87E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Other PeCDD	COPC	1.08E-09	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8-HxCDD	COPC	2.54E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,6,7,8-HxCDD	COPC	4.07E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8,9-HxCDD	COPC	4.33E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Other HxCDD	COPC	7.81E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,6,7,8-HpCDD	COPC	1.14E-10	NVA	NVA	NVA	NVA	Used Total TEQ
Other HpCDD	COPC	1.50E-10	NVA	NVA	NVA	NVA	Used Total TEQ
Total OCDD	COPC	6.44E-11	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,7,8 -TCDF	COPC	3.76E-10	NVA	NVA	NVA	NVA	Used Total TEQ
Other TCDF	COPC	1.88E-09	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8 -PeCDF	COPC	5.79E-11	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,4,7,8 -PeCDF	COPC	1.09E-10	NVA	NVA	NVA	NVA	Used Total TEQ
Other PeCDF	COPC	1.40E-09	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8 -HxCDF	COPC	8.40E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,6,7,8 -HxCDF	COPC	3.72E-11	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,4,6,7,8 -HxCDF	COPC	3.48E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8,9 -HxCDF	COPC	3.28E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Other HxCDF	COPC	2.74E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,6,7,8 -HpCDF	COPC	5.55E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8,9 -HpCDF	COPC	5.74E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Other HpCDF	COPC	2.08E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Total OCDF	COPC	4.98E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Explosives (COPC-Q from Table 4-7)							
1,3,5-Trinitro-1,3,5-triazine (RDX)	COPC-Q	7.81E-06	NVA	NVA	NVA	NVA	
Trinitrotoluene (TNT)	COPC-Q	1.57E-05	NVA	NVA	NVA	NVA	
Cyclotetramethylene-tetranitramine (HMX)	COPC-Q	7.81E-06	NVA	NVA	NVA	NVA	
Nitroglycerine (NG)	COPC-Q	7.81E-06	NVA	NVA	NVA	NVA	
Nitroguanidine (NG)	COPC-Q	7.81E-06	NVA	NVA	NVA	NVA	
Nitrocellulose (NC), Cellulose nitrate	COPC-Q	7.81E-06	NVA	NVA	NVA	NVA	
Nitroglycerine (NG)	COPC-Q	7.81E-06	NVA	NVA	NVA	NVA	
Other Sources (COPCs from Table 4-5 and 4-6)							
Ethanol	COPC	9.54E-04	NVA	NVA	NVA	NVA	
Methanol	COPC	3.90E-04	NVA	4.20E+03	NVA	9.29E-08	
Tetrahydrofuran	COPC	4.86E-04	NVA	NVA	NVA	NVA	
Total					1.2E-06	0.01873	

Note: RSLc for hexavalent chromium based on IUR of 1.2E-2 ($\mu\text{g}/\text{m}^3$) $^{-1}$ * 7, as recommended in RSL Users Guide, to account for 1.6 Cr VI:Cr III ratio.

**Table 1d. Modeling Results
Proposed Off-Site Residential Receptor Location For CDC and OB**

Pollutant Description	Status	Annual MEI	Residential	Residential	Estimated	Estimated	Notes
		Conc	RSL (1-E-6	RSL (1.0			
		ug/m ³	Risk Target)	Hazard Target)			
Inorganics (COPCs from Table 4-8)							
Aluminum	COPC	2.15E-06	NVA	5.20E+00	NVA	4.13E-07	
Antimony	COPC	4.25E-06	NVA	2.10E-01	NVA	2.02E-05	Antimony trioxide
Arsenic	COPC	1.98E-05	5.70E-04	1.60E-02	2.76E-08	9.85E-04	
Barium	COPC	1.72E-06	NVA	5.20E-01	NVA	3.31E-06	
Beryllium	COPC	1.58E-05	1.00E-03	2.10E-02	1.58E-08	7.50E-04	
Cadmium	COPC	1.95E-05	1.40E-03	2.10E-02	1.39E-08	9.28E-04	
Chromium	COPC	1.58E-05	NVA	NVA	NVA	NVA	
Chromium (Hexavalent)	COPC	1.58E-06	1.10E-05	1.00E-01	1.43E-07	1.58E-05	
Cobalt	COPC	2.03E-06	2.70E-04	6.30E-03	7.51E-09	3.22E-04	
Copper	COPC	1.95E-07	NVA	NVA	NVA	NVA	
Lead	COPC	1.95E-05	NVA	NVA	NVA	NVA	Use Lead model
Magnesium	COPC	3.85E-06	NVA	NVA	NVA	NVA	
Manganese	COPC	1.48E-06	NVA	5.20E-02	NVA	2.84E-05	
Mercury	COPC	7.31E-06	NVA	3.10E-02	NVA	2.36E-04	
Nickel	COPC	2.43E-07	9.40E-03	9.40E-02	2.59E-11	2.58E-06	
Selenium	COPC	1.12E-07	NVA	2.10E+01	NVA	5.34E-09	
Silver	COPC	8.16E-08	NVA	NVA	NVA	NVA	
Thallium	COPC	5.61E-08	NVA	NVA	NVA	NVA	
Tin	COPC	3.64E-06	NVA	NVA	NVA	NVA	
Zinc	COPC	6.04E-07	NVA	NVA	NVA	NVA	
Hydrogen Chloride	COPC	2.76E-04	NVA	2.10E+01	NVA	1.32E-05	
Chlorine Gas	COPC	3.75E-06	NVA	1.50E-01	NVA	2.50E-05	
Bromine Gas	COPC	1.45E-05	NVA	NVA	NVA	NVA	
VOCs (COPCs and COPC-Q from Table 4-2)							
Acetone	COPC	8.16E-04	NVA	3.20E+04	NVA	2.55E-08	
Acetonitrile	COPC	5.68E-04	NVA	6.30E+01	NVA	9.01E-06	
Benzene	COPC	8.73E-05	3.10E-01	3.10E+01	2.82E-10	2.82E-06	
Bromodichloromethane	COPC	7.97E-07	6.60E-02	NVA	1.21E-11	NVA	
Bromomethane	COPC	2.93E-06	NVA	5.20E+00	NVA	5.64E-07	
2-Butanone, Methyl ethyl ketone (MEK)	COPC	7.92E-05	NVA	5.20E+03	NVA	1.52E-08	
Carbon tetrachloride	COPC	1.40E-06	4.10E-01	1.00E+02	3.42E-12	1.40E-08	
Chlorodibromomethane	COPC	7.22E-07	9.00E-02	NVA	8.03E-12	NVA	
Chloroform	COPC	4.89E-06	1.10E-01	1.00E+02	4.45E-11	4.89E-08	
1,1-Dichloroethane	COPC	5.31E-07	1.50E+00	NVA	3.54E-13	NVA	
1,2-Dichloroethane (EDC)	COPC	7.62E-05	9.40E-02	7.30E+00	8.11E-10	1.04E-05	
Diethyl ether (ethyl ether)	COPC	4.32E-04	NVA	NVA	NVA	NVA	
Ethyl acetate	COPC	9.56E-05	NVA	NVA	NVA	NVA	
Ethylbenzene	COPC	5.59E-07	9.70E-01	1.00E+03	5.77E-13	5.59E-10	
Ethylened bromide	COPC	5.59E-07	NVA	NVA	NVA	NVA	
Methane	COPC-Q	8.90E-04	NVA	NVA	NVA	NVA	
Methylene chloride	COPC	1.61E-03	5.20E+00	1.10E+03	3.10E-10	1.47E-06	
Styrene	COPC	8.37E-07	NVA	1.00E+03	NVA	8.37E-10	
1,1,2,2-Tetrachloroethane	COPC	6.97E-07	4.20E-02	NVA	1.66E-11	NVA	
Tetrachloroethene	COPC	9.77E-07	4.10E-01	2.80E+02	2.38E-12	3.49E-09	
Toluene	COPC	1.79E-05	NVA	5.20E+03	NVA	3.45E-09	
1,1,1-Trichloroethane	COPC	5.59E-07	NVA	5.20E+03	NVA	1.08E-10	
1,1,2-Trichloroethane	COPC	9.77E-07	1.50E-01	2.10E-01	6.51E-12	4.66E-06	
Trichloroethylene (Trichloroethylene)	COPC	1.13E-04	4.30E-01	2.10E+00	2.63E-10	5.39E-05	
m-p-Xylenes	COPC	1.19E-06	NVA	1.00E+02	NVA	1.19E-08	
Cyclopentane, methyl (TIC)	COPC-Q	5.46E-06	NVA	NVA	NVA	NVA	
Hexane (TIC)	COPC-Q	3.81E-05	NVA	7.30E+02	NVA	5.21E-08	
1-Pentene, 2-methyl (TIC)	COPC-Q	2.10E-07	NVA	NVA	NVA	NVA	
Benzaldehyde (TIC)	COPC-Q	1.47E-06	NVA	NVA	NVA	NVA	
Benzonitrile (TIC)	COPC-Q	5.59E-07	NVA	NVA	NVA	NVA	
Benzoic Acid (TIC)	COPC	9.63E-06	NVA	NVA	NVA	NVA	
SVOCs (COPCs and COPC-Q from Table 4-2)							
Benz(a)anthracene	COPC	1.40E-07	8.70E-03	NVA	1.61E-11	NVA	
Benz(o)fluoranthene	COPC	1.40E-07	8.70E-03	NVA	1.61E-11	NVA	
Benz(x)fluoranthene	COPC	1.75E-07	8.70E-03	NVA	2.02E-11	NVA	
Benz(g,h)perylene	COPC	1.40E-07	NVA	NVA	NVA	NVA	
Benz(e)pyrene	COPC	1.75E-07	8.70E-04	NVA	2.02E-10	NVA	
Bis (2-Ethylhexyl)-phthalate	COPC	1.05E-06	1.00E+00	NVA	1.05E-12	NVA	
Chrysene	COPC	1.40E-07	8.70E-02	NVA	1.61E-12	NVA	
Dibenz(a,h)anthracene	COPC	1.40E-07	8.00E-04	NVA	1.75E-10	NVA	
Di-n-butyl phthalate	COPC	1.36E-06	NVA	NVA	NVA	NVA	
1,2-Dichlorobenzene	COPC	7.02E-07	NVA	2.10E+02	NVA	3.34E-09	
1,4-Dichlorobenzene	COPC	7.02E-07	2.20E-01	8.30E+02	3.19E-12	8.46E-10	
Diethyl phthalate	COPC	3.51E-07	NVA	NVA	NVA	NVA	
Dimethyl phthalate	COPC	3.51E-07	NVA	NVA	NVA	NVA	
2,4-Dinitrotoluene	COPC	7.32E-05	2.70E-02	NVA	2.71E-09	NVA	
Di-n-octyl phthalate	COPC	5.85E-07	NVA	NVA	NVA	NVA	
Diphenylamine	COPC	2.29E-05	NVA	NVA	NVA	NVA	
Indeno[1,2,3-cd]pyrene	COPC	2.11E-07	8.70E-03	NVA	2.42E-11	NVA	
Naphthalene	COPC	2.11E-07	7.20E-02	3.10E+00	2.92E-12	6.79E-08	
Phenanthrene	COPC-Q	1.51E-07	NVA	NVA	NVA	NVA	
Phenol	COPC	7.02E-07	NVA	2.10E+02	NVA	3.34E-09	
(Z) 9,17-Octacadienol (TIC)	COPC-Q	1.53E-06	NVA	NVA	NVA	NVA	
1,3,5,7-Cyclooctatetraene (TIC)	COPC-Q	1.33E-06	NVA	NVA	NVA	NVA	
1,4,3,6-Dianhydro-alpha-d-glucopyranose (TIC)	COPC-Q	2.57E-06	NVA	NVA	NVA	NVA	
1-ethenyl-4-ethylbenzene (TIC)	COPC-Q	2.40E-06	NVA	NVA	NVA	NVA	
1-methyl-2-(2-propenyl) benzene (TIC)	COPC-Q	5.75E-06	NVA	NVA	NVA	NVA	
1-Octadecene (TIC)	COPC-Q	8.92E-07	NVA	NVA	NVA	NVA	
2,5-dimethyl furan (TIC)	COPC-Q	3.12E-06	NVA	NVA	NVA	NVA	
2,6-dimethyl heptane (TIC)	COPC-Q	2.12E-06	NVA	NVA	NVA	NVA	
2-fluoro-6-nitrophenol (TIC)	COPC-Q	7.73E-07	NVA	NVA	NVA	NVA	
2-hexanone (TIC)	COPC-Q	1.57E-06	NVA	3.10E+01	NVA	5.06E-08	
2-methyl octane (TIC)	COPC-Q	3.76E-06	NVA	NVA	NVA	NVA	
2-methyl-5-propyl dodecane (TIC)	COPC-Q	1.27E-06	NVA	NVA	NVA	NVA	
Benzaldehyde (TIC)	COPC-Q	1.66E-06	NVA	NVA	NVA	NVA	
Cyclohexanone (TIC)	COPC-Q	7.26E-07	NVA	7.30E+02	NVA	9.94E-10	
Ethyl benzolic acid (TIC)	COPC-Q	5.42E-06	NVA	NVA	NVA	NVA	
Hexadecanoic acid (TIC)	COPC-Q	1.33E-06	NVA	NVA	NVA	NVA	
Styrene (TIC)	COPC-Q	3.24E-06	NVA	1.00E+03	NVA	3.24E-09	
Tetradecanoic acid (TIC)	COPC-Q	6.92E-07	NVA	NVA	NVA	NVA	
Undecylopentane (TIC)	COPC-Q	7.30E-07	NVA	NVA	NVA	NVA	
PCDD/PCDF (COPCs and COPC-Q From Table 4-2)							
2,3,7,8-TCDD (TEQ)	COPC	4.22E-11	6.40E-08	4.20E-05	6.59E-10	1.00E-06	
2,3,7,8 -TCDD	COPC	1.81E-12	NVA	NVA	NVA	NVA	Used Total TEQ

Pollutant Description	Status	Annual MEI Conc	Residential RSL (1E-6 Risk Target)	Residential RSL (1.0 Hazard Target)	Estimated Cancer Risk	Estimated Non-Cancer Hazard	Notes
		ug/m ³	ug/m ³	ug/m ³			
Other -TCDD	COPC	2.87E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8 -PeCDD	COPC	8.39E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Other PeCDD	COPC	3.15E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8 -HxCDD	COPC	7.43E-12	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,6,7,8 -HxCDD	COPC	1.19E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8,9 -HxCDD	COPC	1.27E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Other HxCDD	COPC	2.32E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,6,7,8 -HpCDD	COPC	3.32E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Other HpCDD	COPC	4.38E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Total OCDD	COPC	1.89E-11	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,7,8 -TCDF	COPC	1.10E-10	NVA	NVA	NVA	NVA	Used Total TEQ
Other TCDF	COPC	5.78E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8 -PeCDF	COPC	1.89E-11	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,4,7,8 -PeCDF	COPC	3.19E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Other PeCDF	COPC	4.11E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8 -HxCDF	COPC	2.46E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,6,7,8 -HxCDF	COPC	1.09E-11	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,4,6,7,8 -HxCDF	COPC	1.01E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8,9 -HxCDF	COPC	9.29E-13	NVA	NVA	NVA	NVA	Used Total TEQ
Other HxCDF	COPC	8.01E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,6,7,8 -HpCDF	COPC	1.62E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8,9 -HpCDF	COPC	1.68E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Other HpCDF	COPC	6.10E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Total OCDF	COPC	1.42E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Explosives (COPC-Q from Table 4-7)							
1,3,5-Trinitro-1,3,5-triazine (RDX)	COPC-Q	1.42E-06	NVA	NVA	NVA	NVA	
Trinitrotoluene (TNT)	COPC-Q	3.01E-06	NVA	NVA	NVA	NVA	
Cyclotetramethylene-tetranitramine (HMX)	COPC-Q	1.42E-06	NVA	NVA	NVA	NVA	
Nitroguanidine (NG)	COPC-Q	1.42E-06	NVA	NVA	NVA	NVA	
Nitrocellulose (NC), Cellulose nitrate	COPC-Q	1.42E-06	NVA	NVA	NVA	NVA	
Nitroglycerine (NG)	COPC-Q	1.42E-06	NVA	NVA	NVA	NVA	
Other Sources (COPCs from Table 4-5 and 4-6)							
Ethanol	COPC	2.06E-04	NVA	NVA	NVA	NVA	
Methanol	COPC	8.58E-05	NVA	4.20E+03	NVA	2.04E-08	
Tetrahydrofuran	COPC	1.07E-04	NVA	NVA	NVA	NVA	
					2.1E-07	0.00341	

**Table 1e. Modeling Results
Proposed Off-Site Residential Receptor Location for ODA**

Pollutant Description	Status	Annual MEI Conc	Residential RSL (1E-6 Risk Target)	Residential RSL (1.0 Hazard Target)	Estimated Cancer Risk	Estimated Non-Cancer Hazard	Notes
		ug/m ³	ug/m ³	ug/m ³			
Inorganics (COPCs from Table 4-8)							
Aluminum	COPC	4.88E-07	NVA	5.20E+00	NVA	9.38E-08	
Antimony	COPC	9.65E-07	NVA	2.10E-01	NVA	4.80E-06	Antimony trioxide
Arsenic	COPC	3.58E-06	5.70E-04	1.80E-02	6.28E-09	2.24E-04	
Barium	COPC	3.91E-07	NVA	5.20E-01	NVA	7.52E-07	
Beryllium	COPC	3.58E-06	1.00E-03	2.10E-02	3.58E-09	1.71E-04	
Cadmium	COPC	4.43E-06	1.40E-03	2.10E-02	3.16E-09	2.11E-04	
Chromium	COPC	3.58E-06	NVA	NVA	NVA	NVA	
Chromium (Hexavalent)	COPC	3.58E-07	1.10E-05	1.00E-01	3.28E-08	3.58E-06	
Cobalt	COPC	4.61E-07	2.70E-04	6.30E-03	1.71E-09	7.31E-05	
Copper	COPC	4.42E-08	NVA	NVA	NVA	NVA	
Lead	COPC	4.43E-06	NVA	NVA	NVA	NVA	Use Lead model
Magnesium	COPC	8.74E-07	NVA	NVA	NVA	NVA	
Manganese	COPC	3.35E-07	NVA	5.20E-02	NVA	6.45E-06	
Mercury	COPC	1.66E-06	NVA	3.10E-02	NVA	5.36E-05	
Nickel	COPC	5.53E-08	9.40E-03	9.40E-02	5.88E-12	5.88E-07	
Selenium	COPC	2.55E-08	NVA	2.10E+01	NVA	1.21E-09	
Silver	COPC	1.85E-08	NVA	NVA	NVA	NVA	
Thallium	COPC	1.28E-08	NVA	NVA	NVA	NVA	
Tin	COPC	8.28E-07	NVA	NVA	NVA	NVA	
Zinc	COPC	1.37E-07	NVA	NVA	NVA	NVA	
Hydrogen Chloride	COPC	6.28E-05	NVA	2.10E+01	NVA	2.99E-06	
Chlorine Gas	COPC	8.53E-07	NVA	1.50E-01	NVA	5.89E-06	
Bromine Gas	COPC	3.30E-06	NVA	NVA	NVA	NVA	
VOCs (COPCs and COPC-Q from Table 4-2)							
Acetone	COPC	2.12E-04	NVA	3.20E+04	NVA	6.61E-08	
Acetonitrile	COPC	1.65E-04	NVA	6.30E+01	NVA	2.62E-06	
Benzene	COPC	2.51E-05	3.10E-01	3.10E+01	8.10E-11	8.10E-07	
Bromodichloromethane	COPC	1.81E-07	6.60E-02	NVA	2.74E-12	NVA	
Bromomethane	COPC	6.86E-07	NVA	5.20E+00	NVA	1.28E-07	
2-Butanone, Methyl ethyl ketone (MEK)	COPC	2.28E-05	NVA	5.20E+03	NVA	4.39E-09	
Carbon tetrachloride	COPC	3.18E-07	4.10E-01	1.00E+02	7.77E-13	3.19E-09	
Chlorodibromomethane	COPC	1.64E-07	9.00E-02	NVA	1.82E-12	NVA	
Chloroform	COPC	1.11E-06	1.10E-01	1.00E+02	1.01E-11	1.11E-08	
1,1-Dichloroethane	COPC	1.21E-07	1.50E+00	NVA	8.05E-14	NVA	
1,2-Dichloroethane (EDC)	COPC	2.22E-05	9.40E-02	7.30E+00	2.36E-10	3.04E-06	
Diethyl ether (ethyl ether)	COPC	1.25E-04	NVA	NVA	NVA	NVA	
Ethyl acetate	COPC	2.74E-05	NVA	NVA	NVA	NVA	
Ethylbenzene	COPC	1.27E-07	9.70E-01	1.00E+03	1.31E-13	1.27E-10	
Ethylene dibromide	COPC	1.27E-07	NVA	NVA	NVA	NVA	
Methane	COPC-Q	2.02E-04	NVA	NVA	NVA	NVA	
Methylene chloride	COPC	3.94E-04	5.20E+00	1.10E+03	7.57E-11	3.58E-07	
Styrene	COPC	1.90E-07	NVA	1.00E+03	NVA	1.90E-10	
1,1,2,2-Tetrachloroethane	COPC	1.59E-07	4.20E-02	NVA	3.77E-12	NVA	
Tetrachloroethene	COPC	2.22E-07	4.10E-01	2.80E+02	5.42E-13	7.93E-10	
Toluene	COPC	4.08E-06	NVA	5.20E+03	NVA	7.84E-10	
1,1,1-Trichloroethane	COPC	1.27E-07	NVA	5.20E+03	NVA	2.44E-11	
1,1,2-Trichloroethane	COPC	2.22E-07	1.50E-01	2.10E+01	1.48E-12	1.06E-06	
Trichloroethene (Trichloroethylene)	COPC	3.30E-05	4.30E-01	2.10E+00	7.57E-11	1.57E-05	
m,p-Xylenes	COPC	2.70E-07	NVA	1.00E+02	NVA	2.70E-09	
Cyclopentane, methyl (TIC)	COPC-Q	1.24E-06	NVA	NVA	NVA	NVA	
Hexane (TIC)	COPC-Q	8.65E-06	NVA	7.30E+02	NVA	1.19E-08	
1-Pentene, 2-methyl (TIC)	COPC-Q	4.77E-08	NVA	NVA	NVA	NVA	
Benzaldehyde (TIC)	COPC-Q	3.33E-07	NVA	NVA	NVA	NVA	
Benzonitrile (TIC)	COPC-Q	1.27E-07	NVA	NVA	NVA	NVA	
Benzic Acid (TIC)	COPC	2.19E-06	NVA	NVA	NVA	NVA	
SVOCs (COPCs and COPC-Q from Table 4-2)							
Benzo(a)anthracene	COPC	3.19E-08	8.70E-03	NVA	3.67E-12	NVA	
Benzo(b)fluoranthene	COPC	3.19E-08	8.70E-03	NVA	3.67E-12	NVA	
Benzo(k)fluoranthene	COPC	3.99E-08	8.70E-03	NVA	4.58E-12	NVA	
Benzo(gh)perylene	COPC	3.19E-08	NVA	NVA	NVA	NVA	
Benzo(a)pyrene	COPC	3.98E-08	8.70E-04	NVA	4.58E-11	NVA	
Bis (2-Ethylhexyl)-phthalate	COPC	2.39E-07	1.00E+00	NVA	2.39E-13	NVA	
Chrysene	COPC	3.19E-08	8.70E-02	NVA	3.67E-13	NVA	
Dibenzo(a,h)anthracene	COPC	3.19E-08	8.00E-04	NVA	3.99E-11	NVA	
Di-n-butyl phthalate	COPC	2.86E-06	NVA	NVA	NVA	NVA	
1,2-Dichlorobenzene	COPC	1.60E-07	NVA	2.10E+02	NVA	7.60E-10	
1,4-Dichlorobenzene	COPC	1.60E-07	2.20E-01	8.30E+02	7.25E-13	1.92E-10	
Diethyl phthalate	COPC	7.97E-08	NVA	NVA	NVA	NVA	
Dimethyl phthalate	COPC	7.98E-08	NVA	NVA	NVA	NVA	
2,4-Dinitrotoluene	COPC	3.46E-05	2.70E-02	NVA	1.28E-09	NVA	
Di-n-octyl phthalate	COPC	1.33E-07	NVA	NVA	NVA	NVA	
Diphenylamine	COPC	5.58E-06	NVA	NVA	NVA	NVA	
Indeno[1,2,3-cd]pyrene	COPC	4.79E-08	8.70E-03	NVA	5.50E-12	NVA	
Naphthalene	COPC	4.79E-08	7.20E-02	3.10E+00	6.65E-13	1.54E-08	
Phenanthrene	COPC-Q	3.44E-08	NVA	NVA	NVA	NVA	
Phenol	COPC	1.60E-07	NVA	2.10E+02	NVA	7.60E-10	
(Z),9,17-Octaacecadienal (TIC)	COPC-Q	3.49E-07	NVA	NVA	NVA	NVA	
1,3,5,7-Cyclooctatetraene (TIC)	COPC-Q	3.03E-07	NVA	NVA	NVA	NVA	
1,4,3,6-Dianhydro-alpha-d-glucopyranose (TIC)	COPC-Q	5.84E-07	NVA	NVA	NVA	NVA	
4-ethoxy-4-ethylbenzene (TIC)	COPC-Q	5.45E-07	NVA	NVA	NVA	NVA	
-methyl-2-(2-propenyl) benzene (TIC)	COPC-Q	1.31E-06	NVA	NVA	NVA	NVA	
1-Octadecene (TIC)	COPC-Q	2.03E-07	NVA	NVA	NVA	NVA	
2,5-dimethyl furan (TIC)	COPC-Q	7.10E-07	NVA	NVA	NVA	NVA	
2,6-dimethyl heptane (TIC)	COPC-Q	4.82E-07	NVA	NVA	NVA	NVA	
2-fluoro-8-nitrophenol (TIC)	COPC-Q	1.78E-07	NVA	NVA	NVA	NVA	
2-hexanone (TIC)	COPC-Q	3.57E-07	NVA	3.10E+01	NVA	1.15E-08	
2-methyl octane (TIC)	COPC-Q	8.56E-07	NVA	NVA	NVA	NVA	
2-methyl-6-propyl dodecane (TIC)	COPC-Q	2.89E-07	NVA	NVA	NVA	NVA	
Benzaldehyde (TIC)	COPC-Q	3.77E-07	NVA	NVA	NVA	NVA	
Cyclohexanone (TIC)	COPC-Q	1.65E-07	NVA	7.30E+02	NVA	2.26E-10	
Ethyl benzoic acid (TIC)	COPC-Q	1.23E-06	NVA	NVA	NVA	NVA	
Hexadecanoic acid (TIC)	COPC-Q	3.03E-07	NVA	NVA	NVA	NVA	
Styrene (TIC)	COPC-Q	7.37E-07	NVA	1.00E+03	NVA	7.37E-10	
Tetradecanoic acid (TIC)	COPC-Q	1.57E-07	NVA	NVA	NVA	NVA	
Undecyclopentane (TIC)	COPC-Q	1.66E-07	NVA	NVA	NVA	NVA	
PCDD/PCDF (COPCs and COPC-Q From Table 4-2)							
2,3,7,8-TCDD (TEQ)	COPC	9.59E-12	6.40E-08	4.20E-05	1.50E-10	2.28E-07	

Pollutant Description	Status	Annual MEI Conc	Residential RSL (1E-6 Risk Target)		Estimated Cancer Risk	Estimated Non-Cancer Hazard	Notes
			ug/m ³	ug/m ³			
			ug/m ³	ug/m ³			
2,3,7,8 -TCDD	COPC	4.11E-13	NVA	NVA	NVA	NVA	Used Total TEQ
Other -TCDD	COPC	6.53E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8 -PeCDD	COPC	1.91E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Other PeCDD	COPC	7.16E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8 -HxCDD	COPC	1.69E-12	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,5,7,8 -HxCDD	COPC	2.71E-12	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8,9 -HxCDD	COPC	2.88E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Other HxCDD	COPC	5.28E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,6,7,8 -HpCDD	COPC	7.55E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Other HpCDD	COPC	9.98E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Total OCDD	COPC	4.29E-12	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,7,8 -TCDF	COPC	2.50E-11	NVA	NVA	NVA	NVA	Used Total TEQ
Other TCDF	COPC	1.31E-10	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8 -PeCDF	COPC	3.85E-12	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,4,7,8 -PeCDF	COPC	7.24E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Other PeCDF	COPC	9.34E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8 -HxCDF	COPC	5.58E-12	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,6,7,8 -HxCDF	COPC	2.47E-12	NVA	NVA	NVA	NVA	Used Total TEQ
2,3,4,6,7,8 -HxCDF	COPC	2.30E-12	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,7,8,9 -HxCDF	COPC	2.11E-13	NVA	NVA	NVA	NVA	Used Total TEQ
Other HxCDF	COPC	1.82E-11	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,6,7,8 -HpCDF	COPC	3.69E-12	NVA	NVA	NVA	NVA	Used Total TEQ
1,2,3,4,7,8,9 -HpCDF	COPC	3.82E-13	NVA	NVA	NVA	NVA	Used Total TEQ
Other HpCDF	COPC	1.39E-12	NVA	NVA	NVA	NVA	Used Total TEQ
Total OCDF	COPC	3.22E-13	NVA	NVA	NVA	NVA	Used Total TEQ
Explosives (COPC-Q from Table 4-7)							
1,3,5-Trinitro-1,3,5-triazine (RDX)	COPC-Q	3.22E-07	NVA	NVA	NVA	NVA	
Trinitrotoluene (TNT)	COPC-Q	6.64E-07	NVA	NVA	NVA	NVA	
Cyclotetramethylene-tetranitramine (HMX)	COPC-Q	3.22E-07	NVA	NVA	NVA	NVA	
Nitroguanidine (NG)	COPC-Q	3.22E-07	NVA	NVA	NVA	NVA	
Nitrocellulose (NC), Cellulose nitrate	COPC-Q	3.22E-07	NVA	NVA	NVA	NVA	
Nitroglycerine (NG)	COPC-Q	3.22E-07	NVA	NVA	NVA	NVA	
Other Sources (COPCs from Table 4-5 and 4-6)							
Ethanol	COPC	6.38E-05	NVA	NVA	NVA	NVA	
Methanol	COPC	2.50E-05	NVA	4.20E+03	NVA	5.95E-09	
Tetrahydrofuran	COPC	3.11E-05	NVA	NVA	NVA	NVA	
Sum					4.9E-08	0.00078	

Table 2. Estimated Risks and Hazards for Non-RCRA Unit Emissions

Maximum Annual Results Averaged over 5 Years - Source Group = ANNUAL (ug/m³)

Receptor Location	Northing	Easting	Allyl Chloride	Antimony	Benzene	1,3-Butadiene	Cadmium	Carbon Tetrachloride	Chloroform	Chromium	Ethyl Benzene	Ethyl Chloride	Lead	Methyl Chloride
Modeled Off-Site Residential Receptor Location for EVI	537615.6	4531356.3	0.00000	0.00000	0.00105	0.00007	0.00045	0.00000	0.00044	0.00000	0.00000	0.00036	0.00000	N/A
Estimated Risk		0.000E+00	N/A	3.39E-09	8.64E-10	3.21E-07	0.001E+00	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	N/A
Estimated Hazard	0.00000	0.00000	0.00000	0.00003	0.00003	0.002143	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	N/A
Child Development Center Receptor Location (Burlington Road)	537095.7	4532322.4	0.00001	0.00001	0.000659	0.00026	0.00254	0.00001	0.00004	0.00262	0.00001	0.00000	0.00209	0.00000
Estimated Risk	2.44E-11	N/A	2.13E-08	3.21E-09	1.81E-06	2.44E-11	3.64E-10	N/A	1.03E-11	N/A	0.00000	0.00000	0.00000	N/A
Estimated Hazard	0.00001	0.00005	0.000021	0.00012	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	N/A
"Combined" On-Site Office Workers Receptor Location	537479.3	4533028.6	0.00003	0.00002	0.000529	0.00039	0.000277	0.00001	0.00002	0.000203	0.00000	0.00000	0.00000	0.00000
Estimated Risk	7.32E-11	N/A	1.71E-08	4.81E-09	1.98E-06	2.44E-11	1.82E-10	N/A	2.06E-11	N/A	0.00000	0.00000	0.00000	N/A
Estimated Hazard	0.00003	0.00010	0.00019	0.00019	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	N/A
Child Development Center Receptor Location (Northeast)	538074.4	4532884.5	0.00001	0.00001	0.000924	0.00047	0.00048	0.00000	0.00002	0.000497	0.00000	0.00000	0.00219	0.00000
Estimated Risk	2.44E-11	N/A	2.98E-08	5.80E-09	3.11E-06	2.44E-11	1.82E-10	N/A	2.06E-11	N/A	0.00000	0.00000	0.00000	N/A
Estimated Hazard	0.00001	0.00005	0.00030	0.00022	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	N/A
Off-Site Residential Receptor Location for CDC & BG	538285.5	4532845.3	0.00000	0.00001	0.000622	0.00005	0.00040	0.00000	0.00001	0.00026	0.00000	0.00000	0.00030	0.00000
Estimated Risk	0.000E+00	N/A	2.00E-09	6.17E-09	2.86E-07	0.000E+00	9.09E-11	N/A	0.000E+00	N/A	0.00000	0.00000	0.00000	N/A
Estimated Hazard	0.00000	0.00005	0.00002	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	N/A
"Combined" Residential Receptor Location	538735.9	4533389.2	0.00000	0.00001	0.00168	0.00010	0.00098	0.00000	0.00001	0.000080	0.00000	0.00000	0.00070	0.00000
Estimated Risk	0.000E+00	N/A	5.42E-09	1.23E-08	7.00E-07	0.000E+00	9.09E-11	N/A	0.000E+00	N/A	0.00000	0.00000	0.00000	N/A
Estimated Hazard	0.00000	0.00005	0.00005	0.00005	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	N/A
Off-Site Residential Receptor Location for ODA	538347.0	4536057.1	0.00001	0.00001	0.00063	0.00004	0.00004	0.00000	0.00000	0.000020	0.00000	0.00000	0.00056	0.00000
Estimated Risk	2.44E-11	N/A	2.03E-09	4.94E-10	3.14E-07	0.000E+00	0.000E+00	N/A	0.000E+00	N/A	0.00000	0.00000	0.00000	N/A
Estimated Hazard	0.00001	0.00005	0.00002	0.00002	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	N/A

Risk and Hazard Estimation

RSL (ug/m³) for Residential Air Exposure (USEPA, Nov 2011) - Cancer Endpoint: 0.41 N/A
RSL (ug/m³) for Residential Air Exposure (USEPA, Nov 2011) - Non-Cancer Endpoint: 1 N/A

antimony trioxide

0.0014 0.41 0.11 NVA
0.021 2.1 100 NVA
0.00000 0.00000 NVA

Lead Model

Cr3

Table 2. Estimated Risks and Hazards for Non-RCRA Unit Emissions

Maximum Annual Results Averaged over 5 Years - Source Group = ANNUA

Receptor Location	Northring	Methyl Chloroform	Methylene Chloride	Nickel	Styrene	Tetrachloroethylene	Toluene	Vinyl Chloride	Sum Risk	Sum Hazard
Modeled Off-Site Residential Receptor Location for EWI	537615.6	0.00000	0.00005	0.00085	0.00000	0.00001	0.00115	0.00000		
Estimated Risk:		NVA	9.62E-12	6.51E-08	NVA	2.44E-11	NVA	0.001E+00	3.98E-07	
Child Development Center Receptor Location (Buffington Road)	537095.7	0.00000	0.00000	0.00691	0.00000	0.00000	0.00000	0.00000		0.026413
Estimated Risk:		NVA	0.000012	0.002391	NVA	0.000E+00	NVA	0.00661	0.00000	
"Combined" On-Site Office Workers Receptor Location	537479.3	0.00000	0.00000	0.04180	0.00000	0.00000	0.00000	0.00000		0.162944
Estimated Risk:		NVA	4.23E-11	3.20E-07	NVA	2.44E-11	NVA	6.25E-11	2.32E-06	
Child Development Center Receptor Location (Northeast)	538074.4	0.00000	0.00000	0.03202	0.00000	0.00000	0.00000	0.00000		0.164409
Estimated Risk:		NVA	4.04E-11	7.89E-07	NVA	2.44E-11	NVA	6.25E-11	3.84E-06	
Off-Site Residential Receptor Location for CDC & BG	539295.5	0.00000	0.00000	0.07894	0.00000	0.00000	0.00000	0.00000		0.287138
Estimated Risk:		NVA	0.00012	0.00037	0.00001	0.00000	0.00000	0.00086	0.00000	
Estimated Hazard:		NVA	2.31E-11	3.94E-08	NVA	0.000E+00	NVA	0.00E+00	3.28E-07	
"Combined" Residential Receptor Location	538735.9	0.00000	0.00000	0.00394	0.00000	0.00000	0.00000	0.00000		0.023076
Estimated Risk:		NVA	0.00019	0.00117	NVA	0.00000	NVA	0.00204	0.00000	
Estimated Hazard:		NVA	3.65E-11	1.24E-07	NVA	0.000E+00	NVA	0.001E+00	8.31E-07	
Off-Site Residential Receptor Location for ODA	538347.0	0.00000	0.00000	0.01245	0.00000	0.00000	0.00000	0.00000		0.059284
Estimated Risk:		NVA	0.00037	0.00029	0.00002	0.00000	0.00052	0.00000	0.00000	
Estimated Hazard:		NVA	7.12E-11	3.09E-08	NVA	0.000E+00	NVA	0.00E+00	3.48E-07	
	0.00000	0.00000	0.00309	0.00000	0.00000	0.00000	0.00000	0.00000	0.024135	

Risk and Hazard Estimation

RSL ($\mu\text{g/m}^3$) for Residential Air Exposure (USEPA, Nov 2011) - Cancer Endpoints
RSL ($\mu\text{g/m}^3$) for Residential Air Exposure (USEPA, Nov 2011) - Non-Cancer Endpoints

nickel soluble salts

Table 3
Cumulative Cancer Risk Evaluation, Picatinny Arsenal

Source(s)	Receptor	Exposure Pathway(s)	Cancer Risk	Comments
EWI	Adult Fisher	Air, Soil, Produce, Fish	3.60E-06	Shaw (2009), hypothetical watershed (from EWI HHRA).
OB	Adult Fisher	Air, Soil, Produce, Fish	4E-07	Shaw (2011) Section 8.1.2.
OD	Adult Fisher	Air, Soil, Produce, Fish	6E-08	Shaw (2011) Section 8.1.2.
CDC	Adult Fisher	Air, Soil, Produce, Fish	5.63E-09	Shaw (2011) Table 8-17.
All	Adult Fisher		4.1E-06	
EWI	Adult, Child Development Center (1)	Air	6.00E-07	Estimated from Off-Site Resident near EWI, 50% < in modeled air conc
OB/OD/CDC	Adult, Child Development Center (1)	Air, Soil, Produce	8.75E-10	Shaw (2011) Table 8-25. Conservatively includes produce ingestion.
Non-RCRA	Adult, Child Development Center (1)	Air	2.26E-06	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, Child Development Center (1)		2.9E-06	
EWI	Adult, Child Development Center (2)	Air	7.90E-08	Equal to On-Site Worker (same distance to EWI from Child Development Center [2]).
OB/OD/CDC	Adult, Child Development Center (2)	Air, Soil, Produce	1.61E-09	Shaw (2011) Table 8-25. Conservatively includes produce ingestion.
Non-RCRA	Adult, Child Development Center (2)	Air	3.94E-06	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, Child Development Center (2)		4.0E-06	
EWI	Adult, Off-Site Farmer MEI	Air, Soil, Produce, Farm Products	2.40E-06	At Arsenal boundary (from EWI HHRA, Shaw 2009), 2nd iteration value.
OB/OD/CDC	Adult, Off-Site Farmer near EWI	Air, Soil, Produce, Farm Products	8.60E-09	Shaw (2011) Table 8-23.
All	Adult, Off-Site Farmer near EWI		2.4E-06	Non-RCRA emission risks not estimated for Farmer.
EWI	Adult, Offsite Resident MEI	Air, Soil, Produce	1.30E-06	At Arsenal boundary (from EWI HHRA, Shaw 2009).
EWI	Adult, Off-Site Resident near EWI	Air	1.20E-06	Estimated using modeled COPC air concentrations (herein). ^a
OB/OD/CDC	Adult, Off-Site Resident near EWI	Air, Soil, Produce	5.79E-10	Shaw (2011) Table 8-25.
Non-RCRA	Adult, Off-Site Resident near EWI	Air	3.96E-07	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, Off-Site Resident near EWI		1.7E-06	
EWI	Adult, Off-Site Resident near OB/CDC	Air	2.10E-07	Estimated using modeled COPC air concentrations (herein).
OB/OD/CDC	Adult, Off-Site Resident near OB/CDC	Air, Soil, Produce	8.59E-10	Shaw (2011) Table 8-25.
Non-RCRA	Adult, Off-Site Resident near OB/CDC	Air	3.28E-07	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, Off-Site Resident near OB/CDC		5.4E-07	
EWI	Adult, Off-Site Resident near ODA	Air	4.90E-08	Estimated using modeled COPC air concentrations (herein).
OB/OD/CDC	Adult, Off-Site Resident near ODA	Air, Soil, Produce	2.20E-09	Shaw (2011) Table 8-25.
Non-RCRA	Adult, Off-Site Resident near ODA	Air	3.48E-07	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, Off-Site Resident near ODA		4.0E-07	
OB/OD/CDC	Adult, On-Site Resident	Air, Soil, Produce	2.36E-09	Shaw (2011) Table 8-25.
EWI	Adult, On-Site Resident	Air	3.50E-07	Estimated using modeled COPC air concentrations (herein).
Non-RCRA	Adult, On-Site Resident	Air	8.31E-07	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, On-Site Resident		1.2E-06	
OB/OD/CDC	Adult, On-Site Worker	Air, Soil, Produce	1.44E-09	Shaw (2011) Table 8-25. Conservatively includes produce ingestion.
EWI	Adult, On-Site Worker	Air	7.90E-08	Estimated using modeled COPC air concentrations (herein).
Non-RCRA	Adult, On-Site Worker	Air	2.32E-06	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, On-Site Worker		2.4E-06	

Table 3
Cumulative Cancer Risk Evaluation, Picatinny Arsenal

Source(s)	Receptor	Exposure Pathway(s)	Cancer Risk	Comments
EWI	Child Fisher	Air, Soil, Produce, Fish	1.40E-06	Shaw (2009), hypothetical watershed (from EWI HHRA).
OB	Child Fisher	Air, Soil, Produce, Fish	2E-07	Shaw (2011) Section 8.1.2.
OD	Child Fisher	Air, Soil, Produce, Fish	1E-08	Shaw (2011) Section 8.1.2.
CDC	Child Fisher	Air, Soil, Produce, Fish	1.15E-09	Shaw (2011) Table 8-18.
All	Child Fisher		1.6E-06	
EWI	Child Off-Site Farmer MEI	Air, Soil, Produce, Farm Products	1.70E-06	At Arsenal boundary [from EWI HHRA, Shaw 2009].
OB/OD/CDC	Child Off-Site Farmer near EWI	Air, Soil, Produce, Farm Products	1.89E-09	Shaw (2011) Table 8-24.
All	Child Off-Site Farmer near EWI		1.7E-06	
EWI	Child Off-Site Resident MEI	Air, Soil, Produce	1.30E-06	At Arsenal boundary [from EWI HHRA, Shaw 2009].
OB/OD/CDC	Child, Off-Site Resident near EWI	Air, Soil, Produce	1.54E-10	Shaw (2011) Table 8-26.
Non-RCRA	Child, Off-Site Resident near EWI	Air	3.96E-07	Conservatively assumed equal to Adult, Off-Site Resident near EWI
All	Child, Off-Site Resident near EWI		1.7E-06	
OB/OD/CDC	Child Off-Site Resident near ODA	Air, Soil, Produce	5.10E-10	Shaw (2011) Table 8-26.
OB/OD/CDC	Child Off-Site Resident near OB/CDC	Air, Soil, Produce	2.55E-10	Shaw (2011) Table 8-26.

^a For informational purposes only and not used in cumulative total (risk of 1.3E-6 from Shaw [2009] used instead, as conservative approach).

Notes:

EWI = Explosive Waste Incinerator (RCRA Unit).

OB = Open Burning Area (RCRA Unit).

OD = Open Detonation Area (RCRA Unit).

CDC = Contained Detonation Chamber (RCRA Unit).

Child Development Center (1) = Buffington Road location

Child Development Center (2) = Northeast location

Non-RCRA Units = Boilers, Firing Ranges, etc. (EMCON, 2012).

MEI = Maximum Exposed Individual.

Table 4
Cumulative Non-cancer Hazard Evaluation, Picatinny Arsenal

Source(s)	Receptor	Exposure Pathway(s)	Non-cancer Hazard	Comments
EWI	Adult Fisher	Air, Soil, Produce, Fish	0.073	Hypothetical watershed (from EWI HHRA, Shaw, 2009).
OB	Adult Fisher	Air, Soil, Produce, Fish	0.057	Shaw (2011) Table 8-5.
OD	Adult Fisher	Air, Soil, Produce, Fish	0.047	Shaw (2011) Table 8-11.
CDC	Adult Fisher	Air, Soil, Produce, Fish	0.00010	Shaw (2011) Table 8-17.
All	Adult Fisher		0.18	
EWI	Adult, Child Development Center (1)	Air	0.014	Estimated from Off-Site Resident near EWI, 50% < in modeled air conc
OB/OD/CDC	Adult, Child Development Center (1)	Air, Soil, Produce	0.0012	Shaw (2011) Table 8-25. Conservatively includes produce ingestion.
Non-RCRA	Adult, Child Development Center (1)	Air	0.16	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, Child Development Center (1)		0.18	
EWI	Adult, Child Development Center (2)	Air	0.16	Equal to On-Site Worker (same distance to EWI from Child Development Center [2]).
OB/OD/CDC	Adult, Child Development Center (2)	Air, Soil, Produce	0.0034	Shaw (2011) Table 8-25. Conservatively includes produce ingestion.
Non-RCRA	Adult, Child Development Center (2)	Air	0.29	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, Child Development Center (2)		0.45	
EWI	Adult, Off-Site Farmer MEI	Air, Soil, Produce, Farm Products	0.029	At Arsenal boundary (from EWI HHRA, Shaw 2009), 1st iteration value.
OB/OD/CDC	Adult, Off-Site Farmer near EWI	Air, Soil, Produce, Farm Products	0.00064	Shaw (2011) Table 8-23.
All	Adult, Off-Site Farmer near EWI		0.030	Non-RCRA emission risks not estimated for Farmer.
EWI	Adult, Off-Site Resident MEI	Air, Soil, Produce	0.016	At Arsenal boundary (from EWI HHRA, Shaw 2009).
EWI	Adult, Off-Site Resident near EWI	Air	0.019	Estimated using modeled COPC air concentrations (herein). ^a
OB/OD/CDC	Adult, Off-Site Resident near EWI	Air, Soil, Produce	0.18	Shaw (2011) Table 8-25.
Non-RCRA	Adult, Off-Site Resident near EWI	Air	0.028	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, Off-Site Resident near EWI		0.22	
EWI	Adult, Off-Site Resident near OB/CDC	Air	0.0034	Estimated using modeled COPC air concentrations (herein).
OB/OD/CDC	Adult, Off-Site Resident near OB/CDC	Air, Soil, Produce	0.0021	Shaw (2011) Table 8-25.
Non-RCRA	Adult, Off-Site Resident near OB/CDC	Air	0.023	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, Off-Site Resident near OB/CDC		0.029	
EWI	Adult, Off-Site Resident near ODA	Air	0.00078	Estimated using modeled COPC air concentrations (herein).
OB/OD/CDC	Adult, Off-Site Resident near ODA	Air, Soil, Produce	0.00089	Shaw (2011) Table 8-25.
Non-RCRA	Adult, Off-Site Resident near ODA	Air	0.024	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, Off-Site Resident near ODA		0.026	
OB/OD/CDC	Adult, On-Site Resident	Air, Soil, Produce	0.0065	Shaw (2011) Table 8-25.
EWI	Adult, On-Site Resident	Air	0.0056	Estimated using modeled COPC air concentrations (herein).
Non-RCRA	Adult, On-Site Resident	Air	0.059	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, On-Site Resident		0.071	
OB/OD/CDC	Adult, On-Site Worker	Air, Soil, Produce	0.0023	Shaw (2011) Table 8-25. Conservatively includes produce ingestion.
EWI	Adult, On-Site Worker	Air	0.0013	Estimated using modeled COPC air concentrations (herein).
Non-RCRA	Adult, On-Site Worker	Air	0.16	Estimated from EMCON (2012) modeled air concentrations, and USEPA residential RSLs.
All	Adult, On-Site Worker		0.16	

Table 4
Cumulative Non-cancer Hazard Evaluation, Picatinny Arsenal

Source(s)	Receptor	Exposure Pathway(s)	Non-cancer Hazard	Comments
EWI	Child Fisher	Air, Soil, Produce, Fish	0.032	Hypothetical watershed (from EWI HHRA, Shaw, 2009).
OB	Child Fisher	Air, Soil, Produce, Fish	0.10	Shaw (2011) Table 8-6.
OD	Child Fisher	Air, Soil, Produce, Fish	0.035	Shaw (2011) Table 8-12.
CDC	Child Fisher	Air, Soil, Produce, Fish	0.00016	Shaw (2011) Table 8-18.
All	Child Fisher		0.17	
EWI	Child Off-Site Farmer MEI	Air, Soil, Produce, Farm Products	0.024	At Arsenal boundary (from EWI HHRA, Shaw 2009).
OB/OD/CDC	Child Off-Site Farmer near EWI	Air, Soil, Produce, Farm Products	0.00070	Shaw (2011) Table 8-24.
All	Child Off-Site Farmer near EWI		0.025	
EWI	Child Off-Site Resident MEI	Air, Soil, Produce	0.016	At Arsenal boundary (from EWI HHRA, Shaw 2009).
OB/OD/CDC	Child, Off-Site Resident near EWI	Air, Soil, Produce	0.00066	Shaw (2011) Table 8-26.
Non-RCRA	Child, Off-Site Resident near EWI	Air	0.028	Conservatively assumed equal to Adult, Off-Site Resident near EWI
All	Child, Off-Site Resident near EWI		0.045	
OB/OD/CDC	Child Off-Site Resident near ODA	Air, Soil, Produce	0.00091	Shaw (2011) Table 8-26.
OB/OD/CDC	Child Off-Site Resident near OB/CDC	Air, Soil, Produce	0.0021	Shaw (2011) Table 8-26.

^a For informational purposes only and not used in cumulative total (hazard of 0.18 from Shaw [2009] used instead, as conservative approach).

Notes:

EWI = Explosive Waste Incinerator (RCRA Unit).

OB = Open Burning Area (RCRA Unit).

OD = Open Detonation Area (RCRA Unit).

CDC = Contained Detonation Chamber (RCRA Unit).

Child Development Center (1) = Buffington Road location

Child Development Center (2) = Northeast location

Non-RCRA Units = Boilers, Firing Ranges, etc. (EMCON, 2012).

MEI = Maximum Exposed Individual.

FIGURES

